ANNUAL PLANNING REPORT 1982

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ANNUAL PLANNING REPORT 1982

CONTENTS

Page

I INFORMATION SYSTEMS ISSUES AND DEVELOPMENTS......... 1
- A. Introduction 1
- B. Issues And Developments Affecting Information Systems: Summary 2
- C. Internal Evolution 4
  - 1. Use Of Commercial Computer Service Firms 4
  - 2. IBM And AT&T Antitrust Settlements 14
  - 3. Technology 16
  - 4. Whither The Bunch? 18
  - 5. Inactive Areas 21
    - a. Software Productivity 21
    - b. Local Area Networks 24
- D. The External Revolution 25
  - 1. Dispersed Processing 27
  - 2. Decision Support Processing 29
- E. Impact Of Dispersed And Decision Support Processing 34

II CROSS INDUSTRY ANALYSIS 53
- A. Introduction 53
- B. Information Systems Budgets 54
- C. Information Systems Staffing 62
- D. Information Systems Planning Issues 71
  - 1. Issue Types 71
  - 2. Issue Groups 74
  - 3. Methodology 74
  - 4. Information Systems Problems 76
  - 5. Objectives 80
  - 6. Initiatives 84
- E. Personal Computers 88

III INDUSTRY SECTOR ANALYSIS................................ 99
- A. Introduction 99
- B. Discrete Manufacturing Sector 100
  - 1. Budgets 100
  - 2. Staffing 105
  - 3. Information Systems Issues 108
  - 4. Personal Computers 116
- C. Process Manufacturing Sector 123
  - 1. Budgets 123
  - 2. Staffing 134

Page

3. Information Systems Issues 149
4. Personal Computers 150

D. Transportation Sector 156
1. Budgets 156
2. Staffing 162
3. Information Systems Issues 162
4. Personal Computers 168

E. Utility Sector 183
1. Budgets 183
2. Staffing 188
3. Information Systems Issues 195
4. Personal Computers 203

F. Banking And Finance Sector 210
1. Budgets 210
2. Staffing 214
3. Information Systems Issues 217
4. Personal Computers 224

G. Insurance Sector 232
1. Budgets 232
2. Staffing 242
3. Information Systems Issues 245
4. Personal Computers 259

H. Distribution Sector 266
1. Budgets 266
2. Staffing 270
3. Information Systems Issues 277
4. Personal Computers 286

I. Services Sector 293
1. Budgets 293
2. Staffing 298
3. Information Systems Issues 305
4. Personal Computers 305

J. Government And Education Sector 320
1. Budgets 320
2. Staffing 323
3. Information Systems Issues 323
4. Personal Computers 335

APPENDIX A: QUESTIONNAIRE 339

APPENDIX B: 1982 RESPONDENTS 347

EXHIBITS

			Page
I	-1	Information Systems Budgets: Expected Increases, 1980-1983	3
	-2	Software Products Growth	6
	-3	Professional Services Growth	7
	-4	Processing Services Growth	8
	-5	Integrated Systems Growth	9
	-6	The Computer Services Supermarket	11
	-7	Different Approaches To Module Use	12
	-8	Selected 1981 Financial Information For Major Computer Manufacturers	19
	-9	Classic And Emerging Productivity Tools	22
	-10	Applicability Of Selected Tools	23
	-11	Installed MIP Growth To 1990	26
	-12	Factors Increasing Use Of Dispersed Processing	30
	-13	Factors Increasing Use Of Decision Support In Processing	33
	-14	Changes In Processing Focus: 1982-1990	35
	-15	Increase In Processing By Processing Type: 1982-1990	36
	-16	Distribution Of Processing By Processing Type: 1982-1990	37
	-17	Current Insurance Communication Network Examples	41
	-18	Company And Agent Characteristics	42
	-19	Insurance Value-Added Network	43
	-20	Insurance Value-Added Network Components	45
	-21	IBM Information Network	47
	-22	IBM Information Network - Difference In Single And Multifirm Focus	48
	-23	Value-Added Banking Network	50
	-24	Value-Added Distribution Network	52
II	-1	Average Anticipated Budget Change For 1983, By Company Size	55
	-2	Information Systems Budgets: Expected Increases, 1980-1983	56
	-3	Rates Of Change In Budget Growth By Industry Sector	58
	-4	1982 Budget Distribution And 1982/1983 Changes	59
	-5	Information Systems Budget As A Percent Of Total Revenues, By Company Size	61
	-6	Information Systems Spending Per Corporate Employee - By Industry Sector	63

			Page
	-7	Information Systems Staffing Changes Expected In The Next 12 Months, By Company Size	64
	-8	Information Systems Turnover By Position	65
	-9	Information Systems Staff Relative Turnover, By Industry Sector	67
	-10	Difficulty In Recruiting Staff - By Position	68
	-11	Difficulty In Recruiting Staff, By Position Type And Company Size	69
	-12	Relative Difficulty In Recruiting Staff, By Industry Sector	70
	-13	New Program Development Versus Maintenance, 1981-1983	72
	-14	Relationship Of Information Systems Problems, Objectives, And Initiatives	73
	-15	Information Systems Issue Areas And Groups	75
	-16	Relative Importance Of Information Systems Problems	77
	-17	Relative Importance Of Information Systems Problems, By Industry Sector	78
	-18	Relative Importance Of Information Systems Problems, By Company Size	79
	-19	Relative Importance Of Information Systems Problems Versus Objectives	81
	-20	Relative Importance Of Information Systems Objectives, By Industry Sector	82
	-21	Relative Importance Of Company Objectives, By Company Size	83
	-22	Relative Importance Of Information Systems Problems, Objectives And Initiatives	85
	-23	Relative Importance Of Information Systems Initiatives, By Company Size	86
	-24	Relative Importance Of Information Systems Initiatives, By Industry Sector	87
	-25	Time Since First Personal Computer Installed In Department	89
	-26	Budget Sources For Personal Computer Funds	90
	-27	Sources Of Assistance For Personal Computer Users	91
	-28	Personal Computer Applications	92
	-29	Types Of Personal Computer Software Packages Used	93
	-30	User Satisfaction And Personal Computer Reliability	95
	-31	User Plans For Additional Personal Computer Software	96
	-32	User Plans For Additional Personal Computer Hardware	97
III	-1	Anticipated Budget Increases For 1983 In Discrete Manufacturing	101
	-2	1982 Budget Distribution And 1982/1983 Changes In The Discrete Manufacturing Sector	102
	-3	Information Systems Budget As A Percent Of Total Revenues In The Discrete Manufacturing Sector	104

Page

-4 Information Systems Spending Per Employee By Company Size In The Discrete Manufacturing Sector 106
-5 Information Systems Changes Expected In The Next 12 Months In The Discrete Manufacturing Sector 107
-6 Current Annual Turnover In The Discrete Manufacturing Sector 109
-7 Difficulty In Recruiting Staff In The Discrete Manufacturing Sector 110
-8 Number Of Programs By Company Size In The Discrete Manufacturing Sector 111
-9 New Program Development Versus Maintenance In The Discrete Manufacturing Sector, 1981-1983 112
-10 New Program Development Versus Maintenance In The Discrete Manufacturing Sector, 1981-1983 113
-11 Information Systems Problems In The Discrete Manufacturing Sector: Summary 114
-12 Information Systems Problems In The Discrete Manufacturing Sector: Detail 115
-13 Information Systems Objectives In The Discrete Manufacturing Sector: Summary 117
-14 Information Systems Planning Objectives In The Discrete Manufacturing Industry: Detail 118
-15 Information Systems Initiatives In The Discrete Manufacturing Sector: Summary 119
-16 Information Systems Initiatives Planned In The Discrete Manufacturing Industry: Detail 120
-17 Personal Computer Acquisition Plans In The Discrete Manufacturing Sector 122
-18 Types Of Personal Computer Software Packages Used By The Discrete Manufacturing Sector 124
-19 Personal Computer Applications In The Discrete Manufacturing Sector 125
-20 Personal Computer Applications In The Discrete Manufacturing Sector 126
-21 Sources Of Assistance For Personal Computer Users In The Discrete Manufacturing Sector 127
-22 Time Since First Personal Computer Installed In User Departments In The Discrete Manufacturing Sector 128
-23 Anticipated Budget Increases For 1983 In Process Manufacturing 129
-24 1982 Budget Distributions And 1982/1983 Changes In The Process Manufacturing Sector 131
-25 Information Systems Budget As A Percent Of Total Budget In The Process Manufacturing Sector 132
-26 Information Systems Spending Per Employee By Company Size In The Process Manufacturing Sector 135
-27 Information Systems Staffing Changes Expected In The Next 12 Months In The Process Manufacturing Sector 136

Page

-28 Current Annual Turnover In The Process Manufacturing Sector 137
-29 Difficulty In Recruiting Staff In The Process Manufacturing Sector 138
-30 Number Of Programs By Company Size In The Process Manufacturing Sector 139
-31 New Program Development Versus Maintenance In The Process Manufacturing Sector, 1981-1983 140
-32 New Program Development Versus Maintenance In The Process Manufacturing Sector, 1981-1983 141
-33 Information Systems Problems In the Process Manufacturing Sector: Summary 142
-34 Information Systems Problems In The Process Manufacturing Sector: Detail 143
-35 Information Systems Objectives In The Process Manufacturing Sector: Summary 144
-36 Information Systems Planning Objectives In The Process Manufacturing Industry: Detail 145
-37 Information Systems Initiatives In The Process Manufacturing Sector: Summary 146
-38 Initiatives Planned In The Process Manufacturing Sector: Detail 147
-39 Personal Computer Acquisition Plans In The Process Manufacturing Sector 151
-40 Types Of Personal Computer Software Packages Used By The Process Manufacturing Sector 152
-41 Personal Computer Applications In The Process Manufacturing Sector 153
-42 Personal Computer Applications In The Process Manufacturing Sector 154
-43 Sources Of Assistance For Personal Computer Users In The Process Manufacturing Sector 155
-44 Time Since First Personal Computer Installed In User Departments In The Process Manufacturing Sector 157
-45 Anticipated Budget Increases For 1983 In Transportation 158
-46 1982 Budget Distribution And 1982/1983 Changes In The Transportation Sector 160
-47 Information Systems Budget As A Percent Of Total Revenues In The Transportation Sector 161
-48 Information Systems Spending Per Employee, By Company Size In The Transportation Sector 163
-49 Information Systems Difficulty In Recruiting Staff In The Transportation Sector 164
-50 Number Of Programs By Company Size In The Transportation Sector 165
-51 New Program Development Versus Maintenance In The Transportation Sector, 1981-1983 166

Page

-52 New Program Development Versus Maintenance In The Transportation Sector, 1981-1983 167
-53 Information Systems Problems In The Transportation Sector: Summary 169
-54 Information Systems Problems In The Transportation Sector: Detail 170
-55 Information Systems Objectives In The Transportation Sector: Summary 171
-56 Information Systems Planning Objectives In The Transportation Sector: Detail 172
-57 Information Systems Initiatives In The Transportation Sector 173
-58 Information Systems Initiatives Planned In The Transportation Sector 174
-59 Personal Computer Acquisition Plans In The Transportation Sector 176
-60 Types Of Personal Computer Software Packages Used In The Transportation Sector 178
-61 Personal Computer Applications In The Transportation Sector 179
-62 Personal Computer Applications In The Transportation Sector 180
-63 Sources Of Assistance For Personal Computer Users In The Transportation Sector 181
-64 Time Since First Personal Computer Installed In User Departments In The Transportation Sector 182
-65 Anticipated Budget Increases For 1983 In The Utilities Sector 184
-66 1982 Budget Distribution And 1982/1983 Changes In The Utilities Sector 185
-67 Information Systems Budget As A Percent Of Total Revenues In The Utilities Sector 187
-68 Information Systems Spending Per Employee By Company Size In The Utilities Sector 189
-69 Information Systems Staffing Changes Expected In The Next 12 Months In The Utilities Sector 190
-70 Information Systems Difficulty In Recruiting Staff In The Utilities Sector 191
-71 Number Of Programs By Company Size In The Utilities Sector 192
-72 New Program Development Versus Maintenance In The Utilities Sector, 1981-1983 193
-73 New Program Development Versus Maintenance In The Utility Sector, 1981-1983 194
-74 Information Systems Problems In The Utilities Sector 196
-75 Information Systems Problems In The Utilities Sector 197
-76 Information Systems Objectives In The Utilities Sector 198

Page

-77 Information Systems Planning Objectives In The Utilities Sector 199
-78 Information Systems Initiatives In The Utilities Sector 200
-79 Information Systems Initiatives Planned In The Utilities Sector 201
-80 Personal Computer Acquisition Plans In The Utilities Sector 204
-81 Types Of Personal Computer Software Packages Used In The Utilities Sector 205
-82 Personal Computer Applications In The Utilities Sector 206
-83 Personal Computer Applications In The Utilities Sector 207
-84 Sources Of Assistance For Personal Computer Users In The Utilities Sector 208
-85 Time Since First Personal Computer Installed In User Departments In The Utilities Sector 209
-86 Anticipated Budget Increases For 1983 In The Banking And Finance Sector 211
-87 1982 Budget Distribution And 1982/1983 Changes In The Banking And Finance Sector 212
-88 Information Systems Budget As A Percent Of Total Budget In The Banking And Finance Sector 213
-89 Information Systems Spending Per Employee By Company Size In The Banking And Finance Sector 215
-90 Information Systems Staffing Changes Expected In The Next 12 Months In The Banking And Finance Sector 216
-91 Current Annual Turnover In The Banking And Finance Sector 218
-92 Information Systems Difficulty In Recruiting Staff In The Banking And Finance Sector 219
-93 Number of Programs By Company Size In The Banking And Finance Sector 220
-94 New Program Development Versus Maintenance In The Banking And Finance Sector, 1981-1983 221
-95 New Program Development Versus Maintenance In The Banking And Finance Sector, 1981-1983 222
-96 Information Systems Problems In The Banking And Finance Sector 223
-97 Information Systems Problems In The Banking And Finance Sector 225
-98 Information Systems Objectives In The Banking And Finance Sector 226
-99 Information Systems Objectives In The Banking And Finance Sector 227
-100 Information Systems Initiatives In The Banking And Finance Sector 228
-101 Information Systems Initiatives Planned In The Banking And Finance Sector 229

Page

-102 Personal Computer Acquisition Plans In The Banking And Finance Sector 231
-103 Types Of Personal Computer Software Packages Used By The Banking And Finance Sector 233
-104 Personal Computer Applications In The Banking And Finance Sector 234
-105 Personal Computer Applications In The Banking And Finance Sector 235
-106 Sources Of Assistance For Personal Computer Users In The Banking And Finance Sector 236
-107 Time Since First Personal Computer Installed In User Departments In The Banking And Finance Sector 237
-108 Anticipated Budget Increases For 1983 In The Insurance Sector 238
-109 1982 Budget Distribution And 1982/1983 Changes In The Insurance Sector 240
-110 Information Systems Budget As Percent Of Total Revenues In The Insurance Sector 241
-111 Information Systems Spending Per Employee By Company Size In The Insurance Sector 243
-112 Information Systems Staffing Changes Expected In The Next 12 Months In The Insurance Sector 244
-113 Information Systems Staffing Current Annual Turnover In The Insurance Sector 246
-114 Information Systems Difficulty In Recruiting Staff In The Insurance Sector 247
-115 Number Of Programs By Company Size In The Insurance Sector 248
-116 New Program Development Versus Maintenance In The Insurance Sector, 1981-1983 249
-117 New Program Development Versus Maintenance In The Insurance Sector, 1981-1983 250
-118 Information Systems Problems In The Insurance Sector 251
-119 Information Systems Problems In The Insurance Sector 253
-120 Information Systems Objectives In The Insurance Sector 254
-121 Information Systems Objectives In The Insurance Sector 255
-122 Information Systems Initiatives In The Insurance Sector 256
-123 Information Systems Initiatives Planned In The Insurance Sector 257
-124 Personal Computer Acquisition Plans In The Insurance Sector 260
-125 Types Of Personal Computer Software Packages Used By The Insurance Sector 261
-126 Personal Computer Applications In The Insurance Sector 262
-127 Personal Computer Applications In The Insurance Sector 263
-128 Sources Of Assistance For Personal Computer Users In The Insurance Sector 264

Page

-129 Time Since First Personal Computer Installed In User Departments In The Insurance Sector 265
-130 Anticipated Budget Increases For 1983 In The Distribution Sector 267
-131 Information Systems Budget As A Percent Of Total Revenues In The Distribution Sector 269
-132 Information Systems Spending Per Employee By Company Size In The Distribution Sector 271
-133 Information Systems Staffing Changes Expected In The Next 12 Months In The Distribution Sector 272
-134 Information Systems Staffing Current Annual Turnover In The Distribution Sector 273
-135 Information Systems Difficulty In Recruiting Staff In The Distribution Sector 274
-136 Number Of Programs By Company Size In The Distribution Sector 275
-137 New Program Development Versus Maintenance In The Distribution Sector, 1981-1983 276
-138 New Program Development Versus Maintenance In The Distribution Sector, 1981-1983 278
-139 Information Systems Problems In The Distribution Sector 279
-140 Information Systems Problems In The Distribution Sector 280
-141 Information Systems Objectives In The Distribution Sector 281
-142 Information Systems Objectives In The Distribution Sector 282
-143 Information Systems Initiatives In The Distribution Sector 283
-144 Information Systems Initiatives Planned In The Distribution Sector 284
-145 Personal Computer Acquisition Plans In The Distribution Sector 287
-146 Types Of Personal Computer Software Packages Used By The Distribution Sector 288
-147 Personal Computer Applications In The Distribution Sector 289
-148 Personal Computer Applications In The Distribution Sector 290
-149 Sources Of Assistance For Personal Computer Users In The Distribution Sector 291
-150 Time Since First Personal Computer Installed In User Departments In The Distribution Sector 292
-151 Anticipated Budget Increases For 1983 In The Services Sector 294
-152 Information Systems Budget As A Percent Of Total Revenues In The Services Sector 296
-153 Information Systems Spending Per Employee By Company Size In The Services Sector 297

		Page
-154	Information Systems Staffing Changes Expected In The Next 12 Months In The Services Sector	299
-155	Current Annual Turnover In The Services Sector	300
-156	Information Systems Difficulty In Recruiting Staff In The Services Sector	301
-157	Number Of Programs By Company Size In The Services Sector	302
-158	New Program Development Versus Mainteance In The Services Sector, 1981-1983	303
-159	New Program Development Versus Maintenance In The Services Sector, 1981-1983	304
-160	Information Systems Problems In The Services Sector	306
-161	Information Systems Problems In The Services Sector	307
-162	Information Systems Objectives In The Services Sector	308
-163	Information Systems Objectives In The Services Sector	309
-164	Information Systems Initiatives In The Services Sector	310
-165	Information Systems Initiatives Planned In The Services Sector	311
-166	Personal Computer Acquisition Plans In The Services Sector	313
-167	Types Of Personal Computer Software Packages Used In The Services Sector	315
-168	Personal Computer Applications In The Services Sector	316
-169	Personal Computer Applications In The Services Sector	317
-170	Sources Of Assistance For Personal Computer Users In The Services Sector	318
-171	Time Since First Personal Computer Installed In User Departments In The Services Sector	319
-172	Anticipated Budget Increases For 1983 In The Government And Education Sector	321
-173	Information Systems Spending Per Employee By Company Size In The Government And Education Sector	322
-174	Information Systems Staffing Current Annual Turnover In The Government And Education Sector	324
-175	Information Systems Difficulty In Recruiting Staff In The Government And Education Sector	325
-176	Number Of Programs By Company Size In The Government And Education Sector	326
-177	New Program Development Versus Maintenance In The Government And Education Sector, 1981-1983	327
-178	New Program Development Versus Maintenance In The Government And Education Sector, 1981-1983	328
-179	Information Systems Problems In The Government And Education Sector	329
-180	Problems In The Government And Education Sector	331
-181	Information Systems Objectives In The Government And Education Sector	332

Page

-182 Information Systems Objectives In The Government And Education Sector 333
-183 Information Systems Initiatives In The Government And Education Sector 334
-184 Information Systems Initiatives Planned In The Government And Education Sector 336

I INFORMATION SYSTEMS ISSUES AND DEVELOPMENTS

I INFORMATION SYSTEMS ISSUES AND DEVELOPMENTS

A. INTRODUCTION

- This annual report for 1982 is divided into three parts.
  - In this chapter, the most important developments which have occurred in the past year are analyzed from the standpoint of their effects, current and future, on information systems (IS) departments.
  - Chapter II examines general cross-industry findings from INPUT's research on such important issues as:
    - Anticipated 1983 IS budget changes.
    - Expected IS staffing changes in 1983.
    - IS budget as a percentage of total revenues.
    - IS spending per employee.
    - IS personnel turnover.
    - Difficulty in recruiting IS staff.

    - New program development versus maintenance.

    - IS problems, planning objectives, and planned initiatives.

    - Personal computer use and plans.

  - Chapter III takes up the same issues as Chapter II, but on an industry-by-industry basis.

B. ISSUES AND DEVELOPMENTS AFFECTING INFORMATION SYSTEMS: SUMMARY

- The past year has witnessed a number of developments affecting IS departments. These are summarized below and discussed at greater length in Sections C and D of this chapter.

  - The foremost short-term development has been the economic downturn, which will reduce 1983 budget growth to the lowest level in many years, as shown in Exhibit I-1.

    - As Chapter II discusses, this relative decline is not totally across the board but varies by industry and individual firms.

    - Not all activities should be equally affected. This is especially true of personal computers. For reasons discussed later in this chapter, the impact of personal computers in the next few years will be great for most organizations. Consequently, considerable industry and cross-industry personal computer data is presented in this report. (For additional analysis on Personal Computers in the IS Strategy, please see INPUT's report of that title dated December 1982).

EXHIBIT I-1

INFORMATION SYSTEMS BUDGETS: EXPECTED INCREASES, 1980-1983

INDUSTRY SECTOR	A EXPECTED INCREASE FOR 1981	B EXPECTED INCREASE FOR 1982	C EXPECTED INCREASE FOR 1983
Discrete Manufacturing	+13.2%	+16.9%	+ 6.7%
Process Manufacturing	+11.1	+14.5	+ 5.9
Transportation	+16.1	+ 9.2	+12.3
Utilities	+12.7	+15.8	+ 6.9
Banking/Finance	+ 9.2	+17.0	+14.6
Insurance	+ 7.9	+11.8	+ 8.2
Distribution	+10.2	+12.3	+ 8.5
Education	+ 4.4	+ 6.4	+11.7
Government	+ 7.4	+11.3	
Service and Other	+11.0	+11.9	+15.6
Averages for all Services	+11.8%	+14.8%	+ 9.1%

↑

miss

        - The economic issues will be discussed in Chapters II and III.

    - Budget pressures are just one of the factors leading companies to consider the increased use of outside software and services.

    - The IBM and AT&T antitrust settlements will have both immediate and longer term impacts.

    - Technology will continue to supply solutions; for example, the computer "horsepower race" is on, with IBM, Univac, and Honeywell all having brought out high MIP models in 1982. This raises the issue of the future of traditional non-IBM mainframe companies.

- There are some really big events beginning to occur. These can be called the "external revolution." They are taking place outside the confines of IS as traditionally defined and, to varying extents, away from the control and, often, knowledge of IS departments. These are discussed in Section D of this chapter and include:

    - Changes in the location and use of computing resources within the organization.

    - Data processing networks between different corporations.

C. INTERNAL EVOLUTION

1. USE OF COMMERCIAL COMPUTER SERVICE FIRMS

- Computer service firms offer processing services, packaged software, professional services, and integrated (turnkey) systems. Many IS managers are unaware of the full magnitude of the use of outside computer services by the typical and, sometimes, their own corporations.

  - This is partly because some types of outside services (such as processing services and turnkey systems) are often purchased without the knowledge of IS and almost always from a different budget.

  - The cost of software purchases may be shared with user departments (for applications) or buried in equipment budgets (for systems software), blurring the size of the transaction.

  - In addition, some IS personnel are philosophically opposed to using outside services and avoid involvement.

- However, the fact is that commercial computer services are growing extremely rapidly and are expected to continue to do so, as shown in Exhibits I-2 through I-5. This growth is fueled from two sources:

  - The products and services themselves.

  - The motivations of the purchasers.

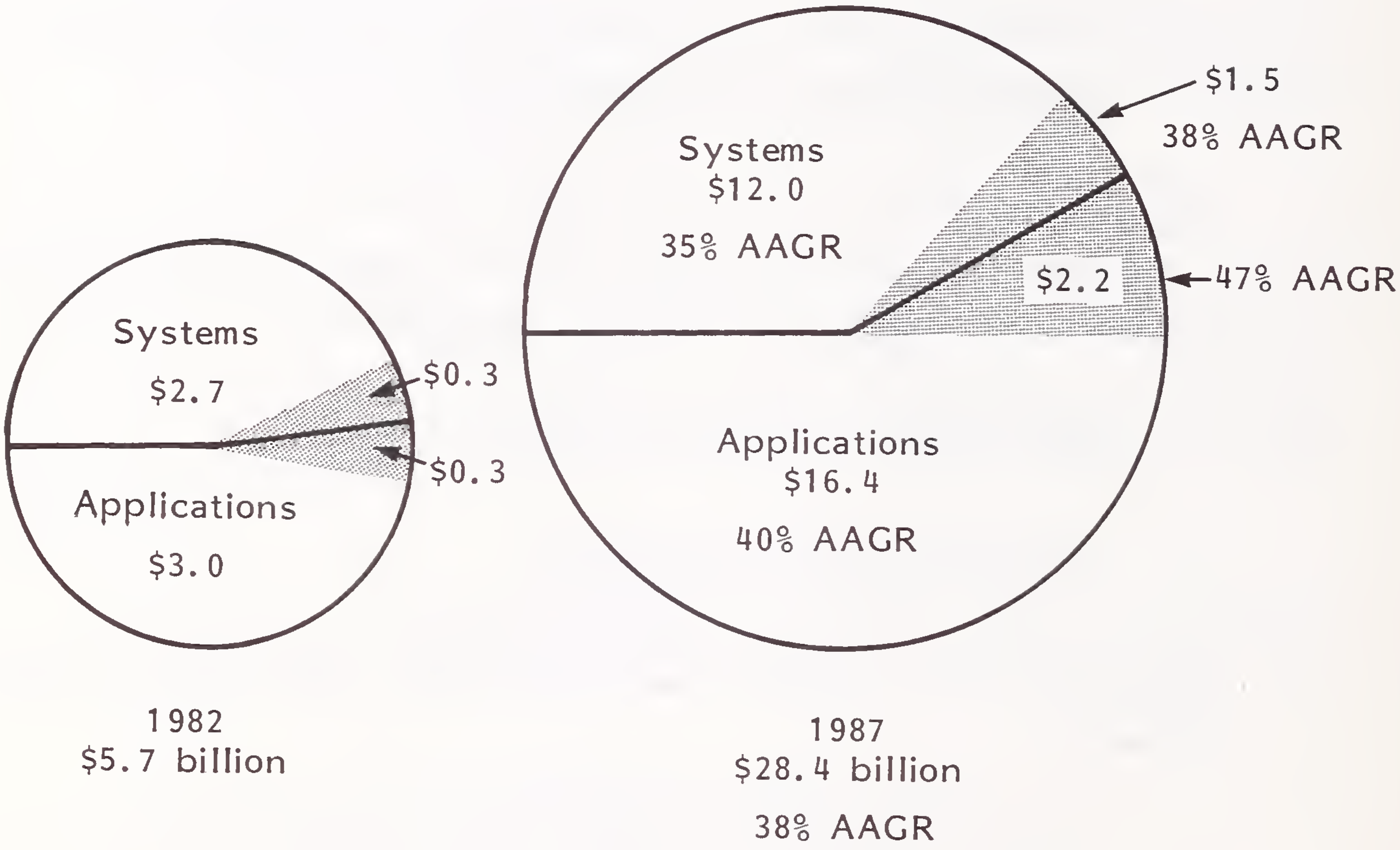
- Computer service companies are continually refining and expanding their products.

  - As the timesharing companies meet increasing competition from in-house timesharing and personal computers, they are expanding into associated microcomputer-based systems (e.g., MCAUTO) or software services (e.g., Comshare).

  - A few software companies (e.g., Cullinane) have moved into processing. Many more are seeking to expand their offerings so that they can provide an integrated set of systems and applications software (e.g., Cullinane and Cincom using their DBMS as a foundation for applications; MSA integrating personal computer and mainframe financial software).

EXHIBIT I-2

SOFTWARE PRODUCTS GROWTH

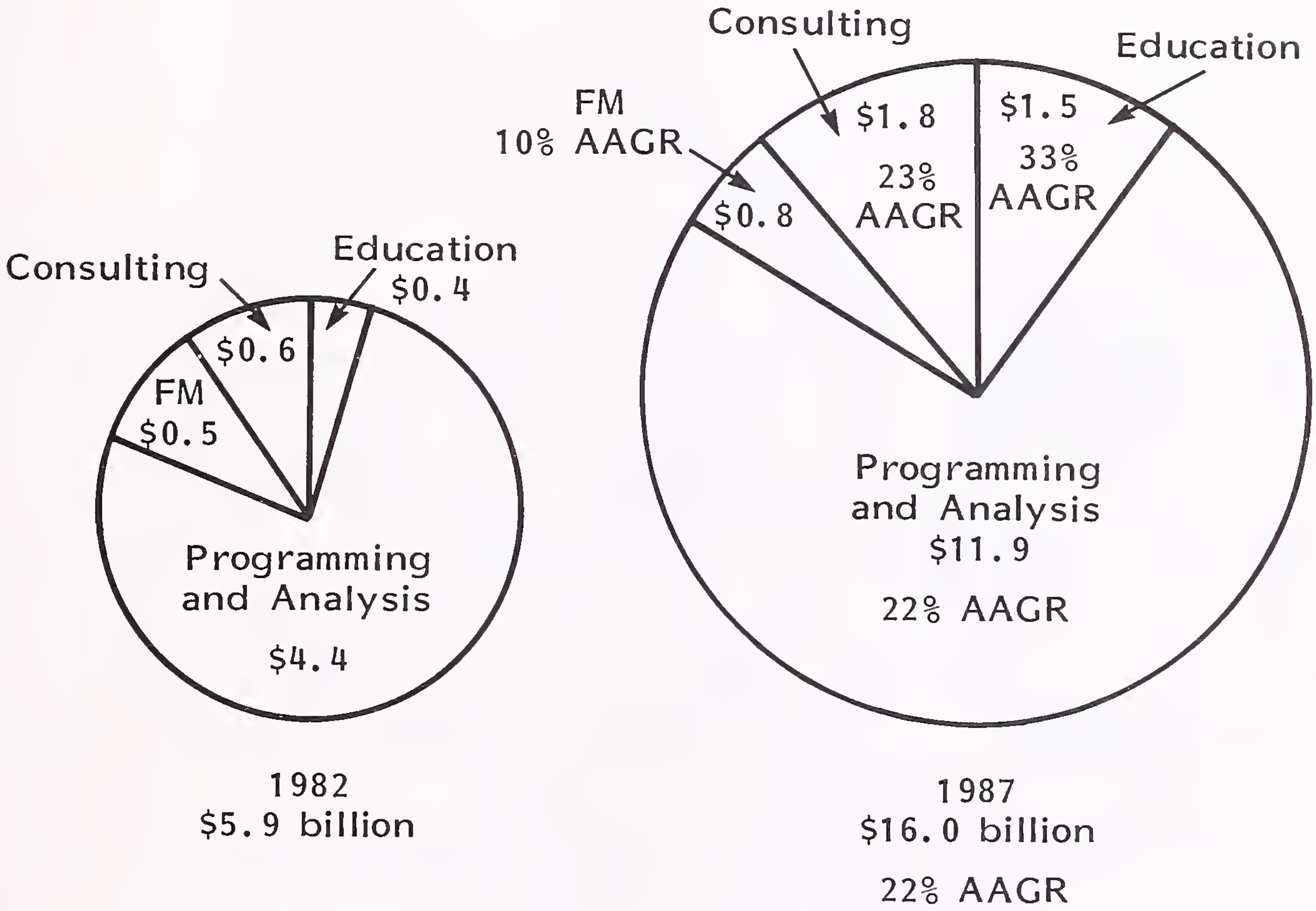


▨ Personal Computers

SOURCE: INPUT Forecasts

EXHIBIT I-3

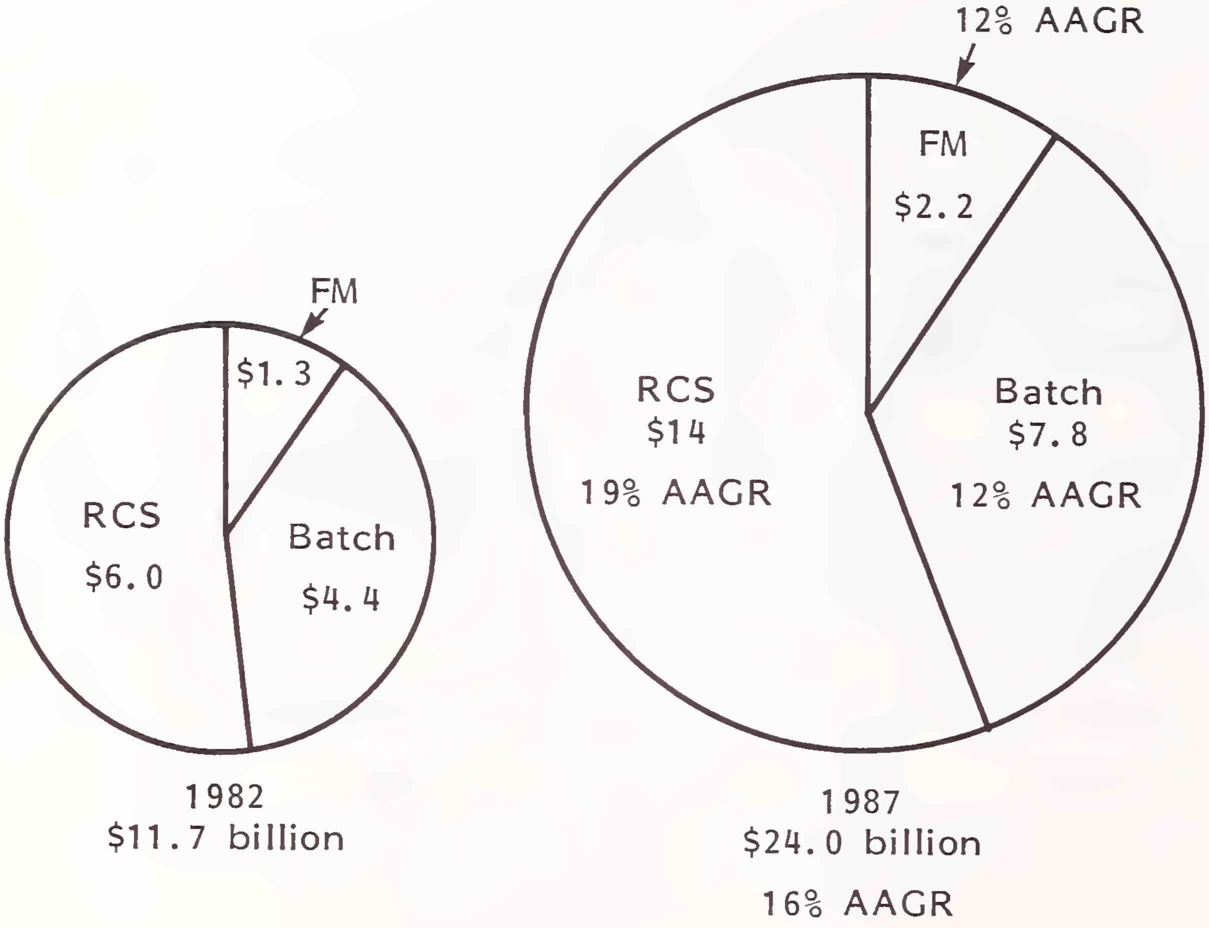
PROFESSIONAL SERVICES GROWTH



SOURCE: INPUT Forecasts

EXHIBIT I-4

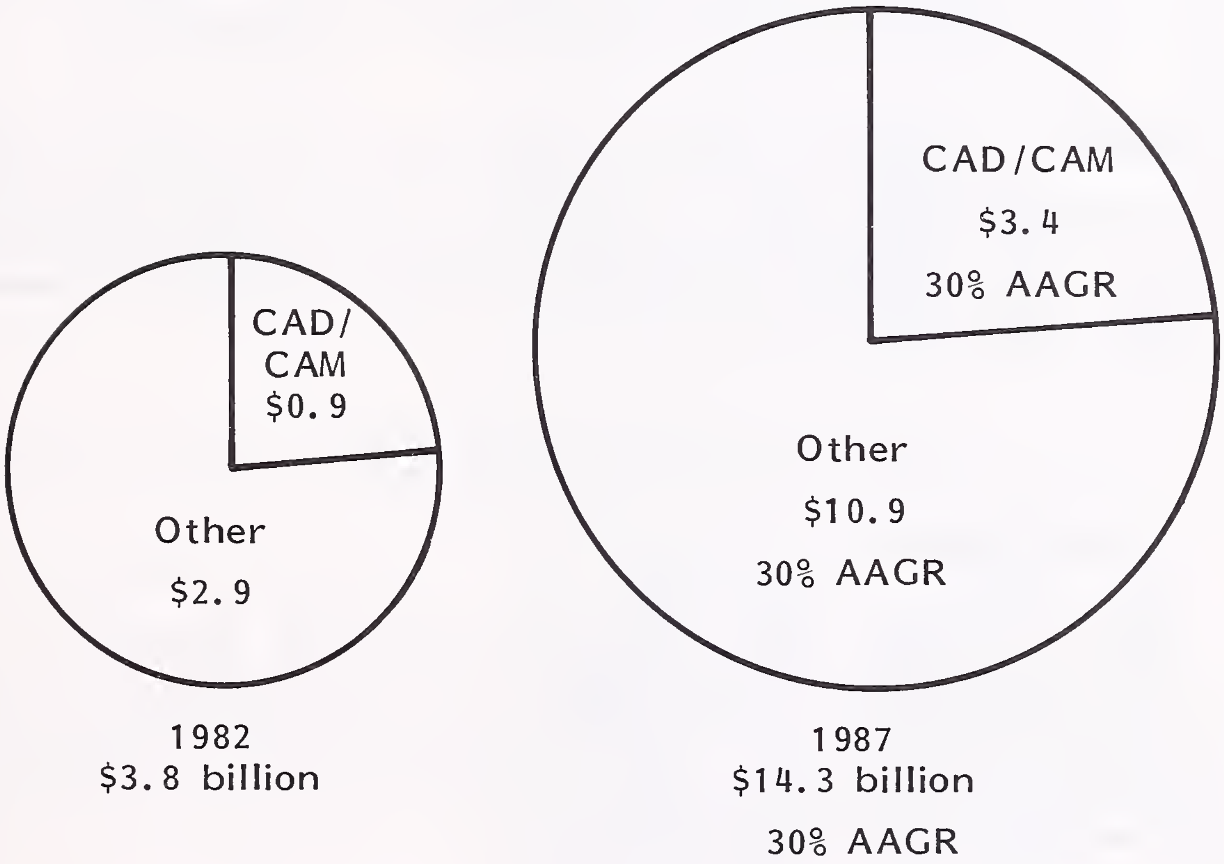
PROCESSING SERVICES GROWTH



SOURCE: INPUT Forecasts

EXHIBIT I-5

INTEGRATED SYSTEMS GROWTH



SOURCE: INPUT Forecasts

  - It is a virtual cliche for many service companies to say that they are trying to offer "solutions, not products."

    - However, this is increasingly a conscious effort. IBM, after all, has shown the way for many years. The most useful (and most successful) computer service companies will be those that offer a "supermarket" of services, as shown in Exhibit I-6.

    - The supermarkets will offer a choice of different kinds of processing, consulting, bodies, software, and hardware.

- It is unlikely that many computer service vendors will make any significant break with the past, except for personal computer related services. The intellectual and financial investments in established patterns of business are too great for that.

  - The vendor focus will instead be on product refinement, integration, and efficiency.

  - In this context, products on the horizon like relational data bases (either software or hardware/software implementations) do not represent a drastic break with the past but are a means of filling a known need more cheaply or effectively.

    - Downloading of specialized data bases and/or programs on a microprocessor (either yours or theirs) is another example of this flexibility.

- One area of refinement, where alert vendors and IS departments are both reaping rewards is in using vendor software as modules or skeletons for in-house systems. Exhibit I-7 shows three approaches to module use.

EXHIBIT I-6

THE COMPUTER SERVICES SUPERMARKET

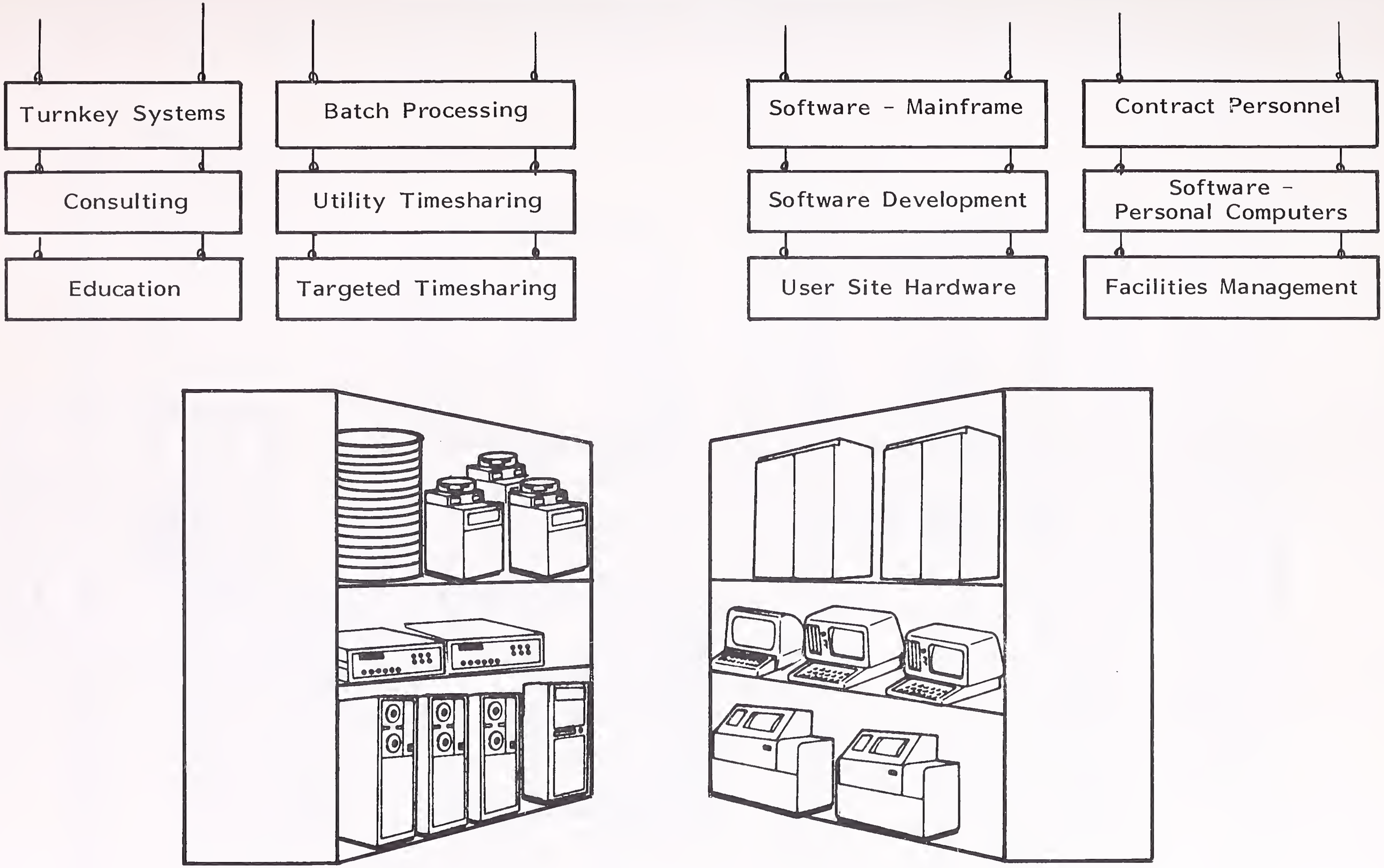
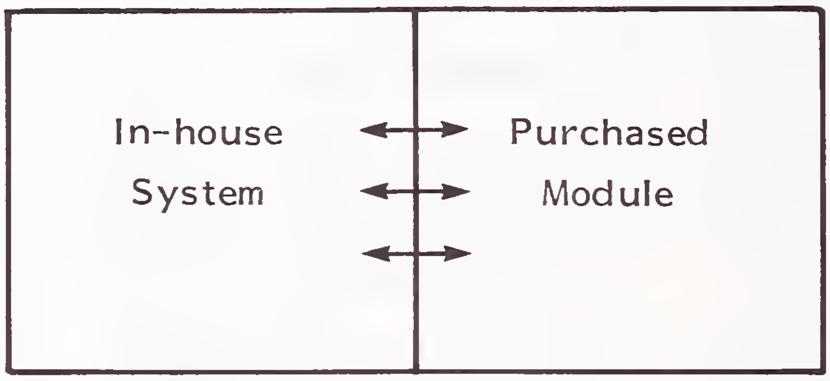


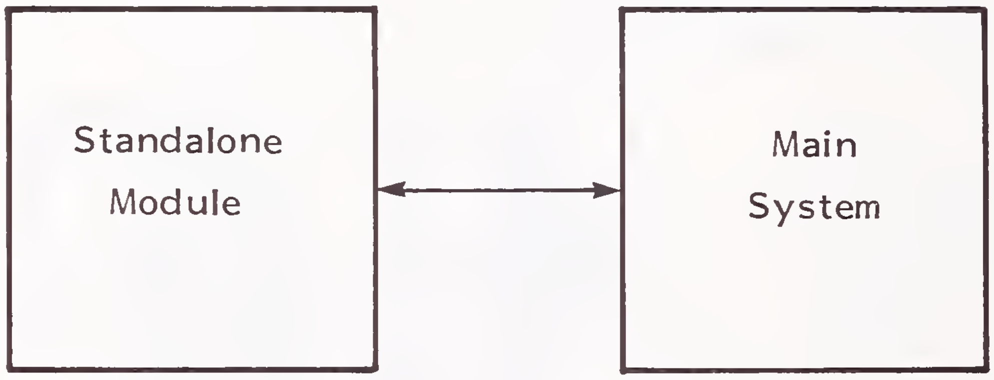
EXHIBIT I-7

DIFFERENT APPROACHES TO MODULE USE

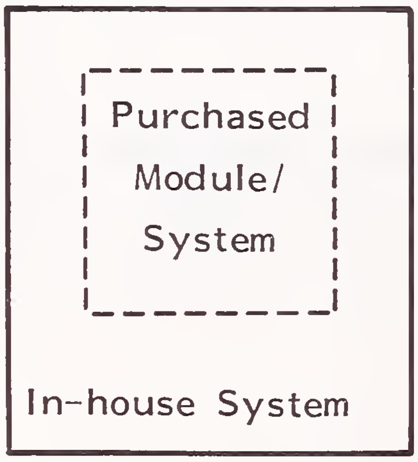
Linked Module:



Standalone Module:



Software Framework:



- Linked modules are often used. Here an external module is linked tightly to an existing system, either as a replacement for an outmoded function or as a new add-on.

- Standalone modules are used where comprehensive systems have not proved practical to design, implement, or operate. Many banks, for example, are looking very closely at dispersing significant amounts of processing to major operational units within the bank. Packaged software can be a very attractive means of accomplishing this. Obviously, vendor software is often more likely to be used where the user department has taken the initiative.

- Software frameworks are from one standpoint a wasteful way of using software packages: the package is purchased, but the code is extensively changed to meet local needs.

  - On the one hand, a great deal of additional corporate investment is required, while at the same time giving up the opportunity of being able to use relatively low-cost vendor maintenance.

  - On the other hand, there are some industries, like insurance, where many companies do represent unique operational environments. The only other alternative would be to write the entire application from scratch. The framework approach can provide significant dollar savings, speed up implementation by a year or more, and provide a higher quality product.

- These kinds of flexibility on the part of both vendors and their customers will be more common in the future. In the short run this flexibility will be dictated by economics. Deciding on the best choice will become more difficult as the alternatives become more complex.

- IS departments will have their own motivations for using outside services.

  - In the past, using outside consultants either on an individual basis or to perform a turnkey programming job has helped to mitigate quantitative and qualitative staff deficiencies.

  - The same approach can be used to get around body-count ceilings (but not, of course, budget ceilings).

  - These are both largely negative reasons for using outside services, as is the software module skeleton in many instances.

- The increased use of packaged software has a much larger positive component, however.

  - In most cases a better, more complete product can be obtained in a shorter period of time.

  - In this context, outside software is increasingly viewed as the most effective productivity tool now available to IS management.

2. IBM AND AT&T ANTITRUST SETTLEMENTS

- In the short run these settlements have proven to be almost anticlimactic, largely because the two companies themselves are only now beginning to take their first steps in the new climate.

- There will be few immediate effects on IBM's actual products; there will be a great deal of change on its market behavior.

  - In the past IBM had to take a very cautious view of the effects its actions would have on its competitors. IBM could not afford to be overly innovative in marketing techniques: if it were too successful it could be accused of predatory actions.

  - IBM will become much more experimental and aggressive in its use of different distribution channels, pricing and discounting, servicing, etc. These will largely work to the benefit of customers. Much of the action will take place in the small-computer end of the market where IBM has been comparatively weak. However, IS management should look for many more innovative moves by IBM in all parts of its business.

- AT&T, on the other hand, has awakened from a long sleep. It has always been able to take a very leisurely approach to mobilizing its strongest components: the Bell Labs intellectual and Western Electric manufacturing bases. Deprived of most of its monopoly power, the new creation, American Bell, will have to learn how to compete.

  - Obvious areas for AT&T to enter are communications, software, and microprocessors. These do not lack for competition (Bell has been losing ground for some time to outside PABX suppliers in noncaptive environments).

  - Bell's Advanced Information Service Net 1000 lost out to IBM in being selected for the insurance industry's value-added network (see Section D of the chapter for additional discussion). Since Net 1000, under different guises (e.g., ACS), has been under development for many years, its defeat by IBM's new Information Network on essentially its home turf is a real setback.

- An unchained Bell must, unlike IBM, put both its product and marketing houses in order. Customers should be prepared for numerous false starts in both areas.

  - American Bell offerings should be examined carefully against the competition. All of the old product, price, and service rules are no longer operative. AT&T for a while may itself not always realize this.

- Some of the "orphaned" telephone companies may be quite shaky for some time to come. They have been left in the unenviable position where being allowed to keep control of the Yellow Pages is judged a business victory. It is not at all clear whether they will be able to offer the sophisticated support needed for complex data networks. Fortunately, there will soon be technical alternatives for their local services (as shown below and discussed at greater length in The Changing Economics of Telecommunications, December 1982).

3. TECHNOLOGY

- Some of the most interesting recent advances have been in local communications. Direct satellite transmission and cellular radio are being developed with entertainment and mobile phones, respectively, in mind.

    - However, each can have important impacts on providing alternatives to the telephone company's (perhaps inadequate) local loops for data transmission.

    - These will both be volume operations aimed at a consumer base. The vendors will be "chasing the learning curve" as in integrated circuits, to the benefit of the business user.

- The MIPS race is heating up. Both Honeywell and Univac have announced new large processors, in what might be their last stand (see Subsection 4, following).

    - Part of the acceleration has been due to advances in electronic packaging that allows components to be smaller, hence, closer together. At the higher processor speeds, the effect of the limitation of the speed of light along relatively long circuit paths becomes a significant factor.

  - As MIPS have become more widely known and used as a benchmark (however imperfect), having a high MIP machine has become a matter of prestige also.

  - However, large single processors can have distinct advantages over coupled smaller processors: coupling to communications networks and mass storage can be less complex and more secure.

- The entire MIPS question takes on a new meaning, however, when viewed against the very fast (one MIP or more) 16 or 32-bit microprocessors now being offered (Charles River Systems, Stratus, Three Rivers).

  - To a certain extent these are solutions looking for a problem. However, with an expected 1983 price of $10,000 for a CPU, operating system, and 100 megabytes of storage, this kind of machine will soon find many suitable problems (e.g., CAD/CAM, mainframe-based modeling).

  - This kind of ultrapower micro (at a micro price) will force many IS departments to rethink their application strategies.

- Tape refuses to die.

  - IBM reactivated its tape drive development and will be offering a new drive.

  - At the other extreme, personal computer vendors first "reinvented" the Winchester disk and then found they had to supply tape drives to back up their mass storage.

- While tape keeps rising from its deathbed, videodisk keeps postponing its data processing birth.

- New recording techniques (e.g., vertical recording) promise at least another generation of magnetic disk storage.

- However, more and more manufacturers are queuing in the wings to bring out videodisk products. Their prospects are improved by the experience gained in manufacturing videodisks for the consumer market (even though consumer response has fallen short of that originally expected).

- Breakthroughs in the ability to erase and rerecord on videodisks will greatly add to the acceptance of this technology for conventional (e.g., backup) applications.

4. WHITHER THE BUNCH?

- The question might also be phrased: "Wither the BUNCH (Burroughs, Univac, NCR, Control Data, Honeywell)?" The financial position of many of IBM's traditional competitors is not healthy, as shown in Exhibit I-8.

  - The BUNCH's debt-to-equity ratio is at near the danger line (commonly held to be 25%-30%).

  - IBM's R&D spending was four times as great as that of the number two firm, Honeywell. Can anyone except IBM maintain separate development across the board?

- What particular advantages does BUNCH hardware or software offer against the de facto IBM standard? The answer is, unfortunately, less and less. The BUNCH rarely conquer a new, nongovernment site; instead, there is a slow erosion of their customer base. If, hypothetically, someone were to invent a BUNCH-to-IBM translator, the desertion rate would be extraordinary.

EXHIBIT I-8

SELECTED 1981 FINANCIAL INFORMATION FOR MAJOR COMPUTER MANUFACTURERS

($ millions)

	BURROUGHS	CONTROL DATA*	DIGITAL EQUIPMENT†	HONEYWELL	IBM	SPERRY UNIVAC‡
Revenue	$3,318.5	$4,162.6	$3,586.6	$5,351.2	$29,070	$5,571.4
Net Income	148.9	170.6	405.0	259.3	3,308	221.8
Interest Expense	145.1	492.3	11.8	150.2	407	294.1
Interest Income	86.9	701.2	87.5	99.0	368	47.1
Net Interest Expense (Income)	58.2	76.5	(75.7)	51.2	39	247.0
Short Term Debt	428.7	189.2	9.1	115.0	773	527.6
Long Term Debt	804.3	380.4	87.9	605.8	2,669	716.8
Total Debit	1,233.0	569.6	97.0	720.8	3,442	1,244.4
Shareholders' Equity	2,180.1	1,577.6	2,899.6	2,098.0	18,161	2,384.4
Debt/Equity Ratio	36.9%	24.1%	3.0%	28.9%	14.7%	30.1%

* Net interest expense shown is for Control Data's computer operation only. The bulk of interest expense and interest income is attributable to Commercial Credit Corp.

† For the twelve month period ended December 1981 (DEC's fiscal year ends in June).

‡ For the fiscal year ended March 31, 1982.

SOURCE: **Financial Statements**

- Mainframes, even, to a degree, IBM-compatible mainframes are not where the action is.

    - NCR has already effectively dropped out of the mainframe race; Control Data has a specialized niche.

    - Honeywell has been successful with its own small machines. However, Burroughs has been much less successful, and Univac's purchase of Varian did not help Univac, while it practically eliminated Varian as a serious mini company.

- What the BUNCH does have is size, recognized names, contacts and established sales and service organizations. Recognizing this, both Burroughs and NCR have become OEMs for the very attractive Convergent Technologies micro.

    - This can give the BUNCH good, "instant" products at a low investment. There is no lack of potential micro vendors.

    - The micro vendors benefit by staying independent and light on their feet while at the same time receiving a respectable cash flow.

- It is too early to say if the BUNCH can actually pull off what should be a feasible strategy. However, if they succeed they can provide customers a "third way" between IBM and small vendors with technically attractive products but uncertain staying power.

    - The "third way" also means that there is automatic second sourcing for customers, assuming that the large firm does not make the error of absorbing the smaller firm.

5. INACTIVE AREAS

a. Software Productivity

- Software productivity has, unfortunately, been a relatively inactive area for many organizations. This inactivity has occurred because of the very difficult requirement to bring together three key elements:

  - Tools.

  - An understanding of the environment.

  - The human element.

- Productivity tools have suffered above all by being offered by small companies and not by IBM, as shown in Exhibit I-9. In addition, the tools are not complete.

  - No single tool or set of tools provides a comprehensive environment from feasibility study to maintenance, as shown in Exhibit I-10.

  - Most tools fit in poorly or not at all with existing procedures.

- In addition, all too often software productivity tools must be taken on faith: demonstrating their effectiveness and pay-off has proven difficult, although not primarily because of the tools themselves:

  - Obtaining reliable, consistent facts for a selection of full-sized development projects has proven very difficult; this is often because the added overhead is not considered worth the burden.

  - An associated problem is that much of the benefit from an effective development tool will come about during the maintenance phase.

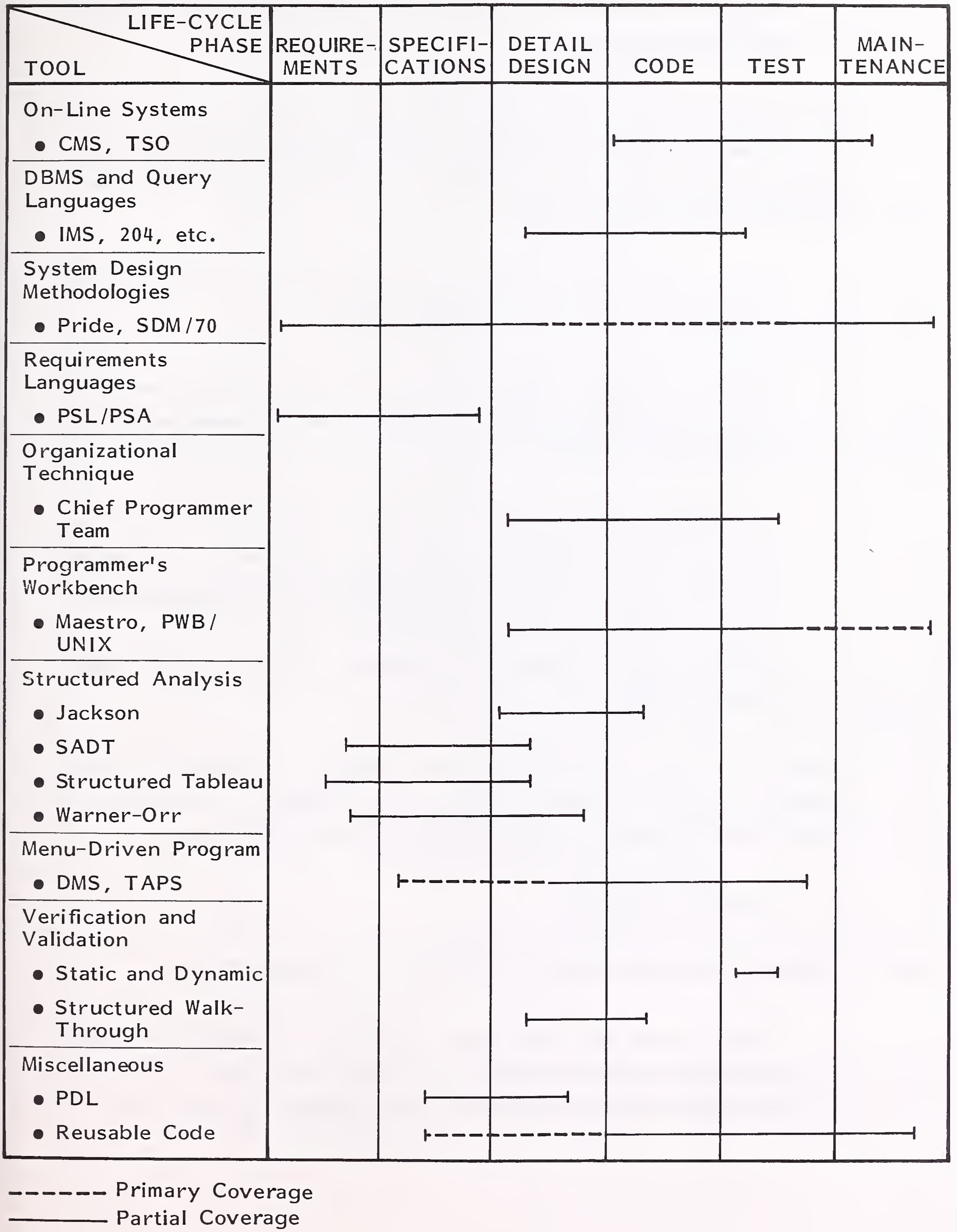
EXHIBIT I-9

CLASSIC AND EMERGING PRODUCTIVITY TOOLS

CLASSIC PRODUCTIVITY TOOLS	EMERGING PRODUCTIVITY TOOLS
• Data base management system (e.g., ADABAS, TOTAL, IMS)	• System design methodologies (e.g., PRIDE, SDM/70)
• Modern high-level languages (e.g., "C," Pascal)	• Requirements languages (e.g., PSL/PSA)
• Library system (e.g., Panvalet, Librarian)	• Organizational techniques (e.g., Chief Programmer Team, Matrix Organization)
• Preprocessors (e.g., Metacobol, S-FORTRAN)	• Programmer's workbench (e.g., MAESTRO, UNIX/PWB)
• Performance measurement aids (e.g., SMF, RMF, LOOK)	• Structured analysis (e.g., Jackson, SADT, Yourdon)
• Word processing and text management systems (e.g., ATMS, SCRIPT)	• Menu-driven programming (e.g., DMS, ADF)
• Automatic flow charters (e.g., AUTOFLOW)	• Reusable Code Systems (e.g., Raytheon's UPP)
• On-line program development aids (e.g., TSO, CMS)	• Verification and validation systems
• Project control systems (e.g., Nichols, PAC II, PC/70)	

EXHIBIT I-10

APPLICABILITY OF SELECTED TOOLS



However, the time horizon this implies is much longer than that used by most organizations.

- While tools themselves have their shortcomings, a larger problem is that productivity tools have been designed for use in constructing new systems; in addition, many people's view of software productivity does not extend much past the coding phase of a project.
    - In fact, for most organizations, mainteance activities account for as many software resources as new development.
    - "New" development itself does often not involve building brand new systems but reworking existing software or blending purchased modules into an in-house system.
    - In these environments, many productivity tools do not function at optimum levels. In general, maintenance productivity is at about the same place where new systems productivity was 15 years ago; i.e., the issues are only now being thought through. Tools are yet to come. (See INPUT's Report Software Maintenance: The Uninvited Guest, November 1982.)
- Above all, software productivity is about people much more than tools. Ironically, a partial awareness of this may be delaying the acquisition of software tools that will, in fact, pay for their use many times over.

b. Local Area Networks

- Local Area Networks (LANs) have not taken off for several reasons:
    - There are over two dozen different products to choose from now, most of them technically incompatible. No one wants to be left with one of the losers. Everyone is awaiting a clear de facto or de jure standard.

  - More basically, though, this is an example of a solution being fully ready before the problem has been defined.

- The contrast to personal computers is illustrative and striking:

  - Personal computers suffer from about the same amount of nonstandardization and overabundance of vendors.

  - However, personal computers have filled a definite need and, in spite of their imperfections, have taken the business world by storm.

- LANs will not be another Picturephone (technically functional but never commercially accepted). However, there will be few risks in letting potential users set the pace for installation.

D. THE EXTERNAL REVOLUTION

- INPUT expects that processing power will continue to increase for the remainder of this decade at the same or a somewhat higher rate than since the early 1970s.

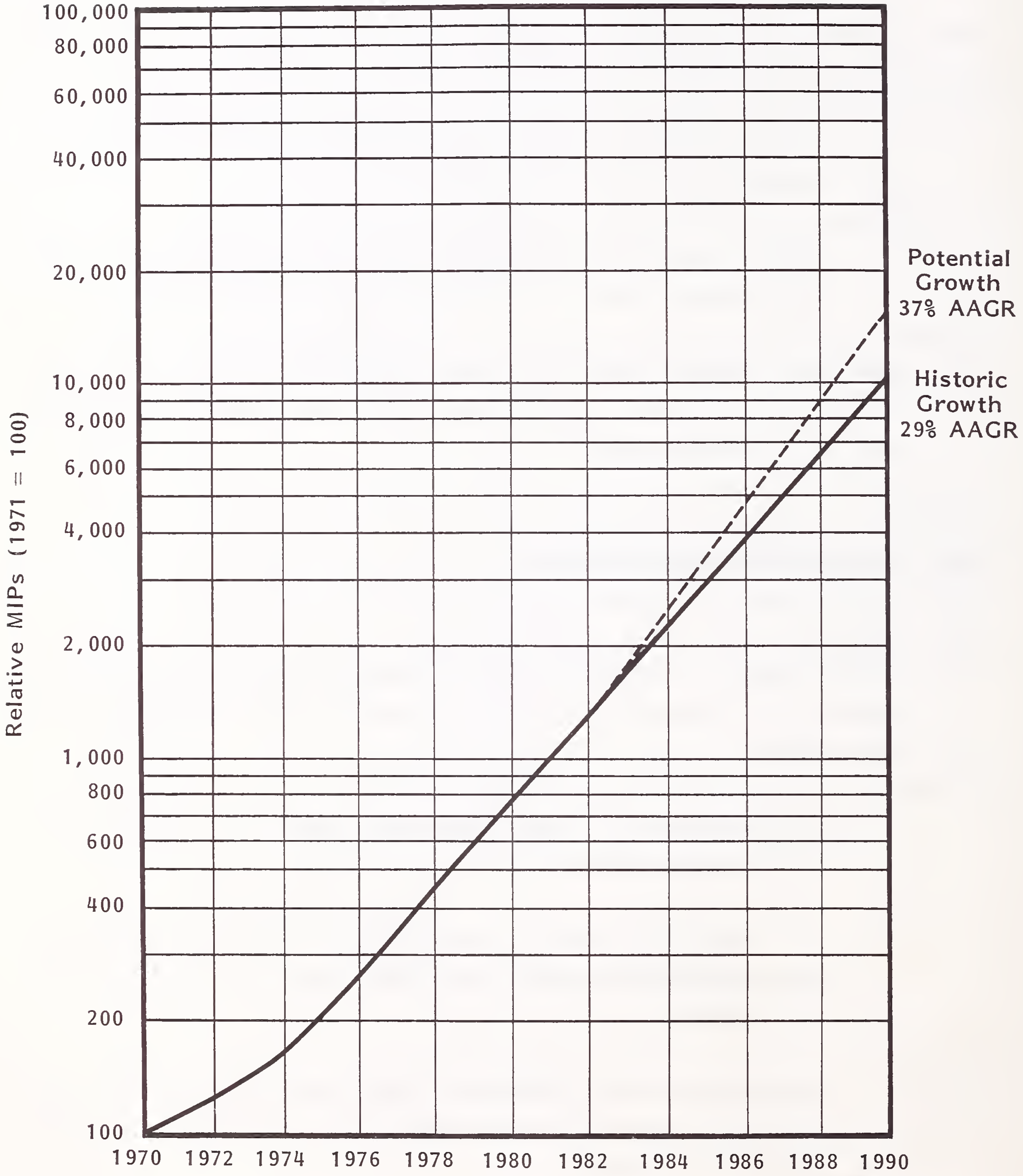
  - This historic rate of increase has averaged 29% per year. This rate may become as much as 37% from now to 1990.

  - This means that installed processing power will be approximately 10 times greater in 1990 than it was in 1982. Exhibit I-11 illustrates these growth trends.

  - Mass storage will be increasing at least as fast as processing power. The increase in mass storage may well be even higher as optical storage is introduced.

EXHIBIT I-11

INSTALLED MIP GROWTH TO 1990



SOURCE: INPUT Forecasts

- The processing environment of the mid and later 1980s will not be in the traditional mold, however. Currently, centralized processing, usually transaction-oriented, accounts for the great majority of processing. Through the rest of the 1980s this will be changing until by 1990 dispersed processing and decision support processing will account for a majority of processing activities.

I. DISPERSED PROCESSING

- Dispersed processing contains all the processing activities that take place away from the traditional central data center.

    - These activities include:

        - Personal computers.

        - Word processing.

        - Turnkey systems.

        - Commercial timesharing.

        - "True" distributed data processing.

    - There will always be some grey areas between dispersed and centralized processing.

        - The amount of local intelligence and local processing required for "true" DDP will vary according to local circumstances.

        - In principle, the information center approach can provide a "virtual" dispersal of computing power to users. It is, however, still a centrally supplied service and, more important, in practice is centrally administered timesharing.

  - The acid test of dispersed processing is whether the preponderance of control over the use of resources is exerted on the local, almost always, end-user level.

- There are many factors encouraging the use of dispersed processing, the most important of which are personal computers and users' perceived needs (i.e., demands) for additional control over data processing.

  - Almost as important is the need to deal with central systems data.

    - Local preprocessing of data will greatly improve its quality and will often decrease the amount of "massaging" needed to prepare it for the central system.

    - Postprocessing of mainline data is needed to tailor uniform data to the needs of a particular unit.

  - Specialized turnkey systems (e.g., in banking) will meet the processing needs of individual operations that can be at least partially segmented from mainline systems.

  - The increasing costs and, especially, the increasing complexities and uncertainties of telecommunications will place a premium on being as self-sufficient as possible.

  - Somewhat less important but still propelling forces are the following:

    - The information center concept is important. The idea of making computing easily accessible to end users is a powerful one.

- Commercial timesharing services have historically brought computing to end users. They still have considerable attraction in the speed, ease of use, specialized products, and knowledge available. However, the expense can be considerable. Here again, it is the idea of end-user computing that is important.

- Finally, local systems can add to overall security and backup by allowing individual nodes to take over in the case of a central problem (and vice versa). This would be a more important factor if security issues were themselves accorded higher priority.

- Exhibit I-12 categorizes these factors by their strength, i.e., importance.

2. DECISION SUPPORT PROCESSING

- Decision support processing consists of a number of nontraditional uses of data processing including, among others:

  - Financial modeling and forecasting. (See INPUT's multiclient study, Opportunities in Financial Planning Systems Markets: 1982-1987, December 1982.)

  - Design (e.g., CAD/CAM).

  - Product and market analysis.

  - Operations research.

- Besides using specialized Decision Support System (DSS) software, these functions will also require increasing amounts of DBMS and graphics capability. (See INPUT's management brief, Business Graphics: Boon or Boondoggle, August 1982.)

EXHIBIT I-12

FACTORS INCREASING USE OF DISPERSED PROCESSING

Strength of Factor

Low		Medium		High
	• Information Center Concept	• Specialized Turnkey Systems (especially micro-based)	• Better Data for Central Systems (local pre/post-processing)	• Personal Computers (ease, speed, increasing power, cheap)
	• Timesharing Services (ease, speed, specialized products, but costly)	• Telecommunications Avoidance (complexity, cost uncertainties)		• User Demands for Control
	• Security			

- Decision support processing will certainly be driven forward by technical advances in software and the means of delivery.

  - Software advances:

    - The number of software packages aimed at this market, especially for personal computers, is increasing rapidly.

    - Equally important, prices are falling while features and functionality are improving.

    - Graphics capabilities will be an important driving force.

  - Delivery advances.

    - Commercial and in-house timesharing have been the usual means of delivering decision support services. The interaction and speed necessary for users (typically well-paid analysts) have made timesharing obligatory.

    - The advent of the personal computer in the corporate environment has added an extremely important new delivery system.

    - INPUT expects the personal computer to have a very large, relatively quick impact on many organizations. (See INPUT's report, Personal Computers in the Information Systems Strategy, December 1982, and detailed data in Chapters II and III of this report.)

- Increasingly inexpensive means of delivering graphics will also spur decision support use. INPUT's management brief, Business Graphics: Boon or Boondoggle, August 1982, discusses the advances in CRTs (especially color), plotters, slidemakers, etc.

- Important as the technical incentives are to use decision support processing, the overall business and management setting may be even more important.

  - The current era of financial stringency requires more analysis and backup for investment and budget decisions. Fighting for market share places a high premium on market, product, and sales analyses. Squeezing costs through greater operating efficiencies increasingly calls for close quantitative analysis of alternatives.

  - Many executives, especially in large companies, expect that decisions will be predicated on quantitative analyses. MBA training has increasingly stressed this approach.

  - Finally, there is the bandwagon effect. Companies and individuals believe that they must "keep up with the Joneses" by using decision support tools.

- This impressive list of factors leading to increased DSS use is summarized in Exhibit I-13.

  - Much activity in the IS area (especially among vendors) is aimed at decision support. It is only a partial exaggeration to say that the availability of these kinds of computer tools leads to their use.

  - There is an interplay among these factors: better software leads to easier delivery. Easier delivery makes decision support tools more important in management decision making. Increased use in decision making leads to more powerful software, etc.

EXHIBIT I-13

FACTORS INCREASING USE OF DECISION SUPPORT IN PROCESSING

- Software
  - Larger choice
  - Increased capabilities
  - A range of price levels

- More delivery alternatives
  - Commercial timesharing (early 1970s)
  - In-house timesharing (late 1970s)
  - Personal computers (1980s)
  - Inexpensive graphics output

- Financial stringency
  - Investment and budget decisions
  - Market/sales segmentation
  - Operating efficiencies

- Management expectations
  - Increased quantification
  - MBA training

- Bandwagon effect

E. IMPACT OF DISPERSED AND DECISION SUPPORT PROCESSING

- The forces favoring dispersed and DSS processing will create significant changes by 1990. INPUT forecasts that:

  - Centralized processing will decline from 80% of total processing in 1982 to 45% in 1990.

  - DSS processing will increase from 35% of total processing in 1982 to 60% in 1990.

- Exhibit I-14 illustrates these changes in processing focus.

  - Dispersed DSS processing will account for over half of all processing by 1990.

  - Traditional centralized transaction processing will have shrunk from 55% of all processing to 20%.

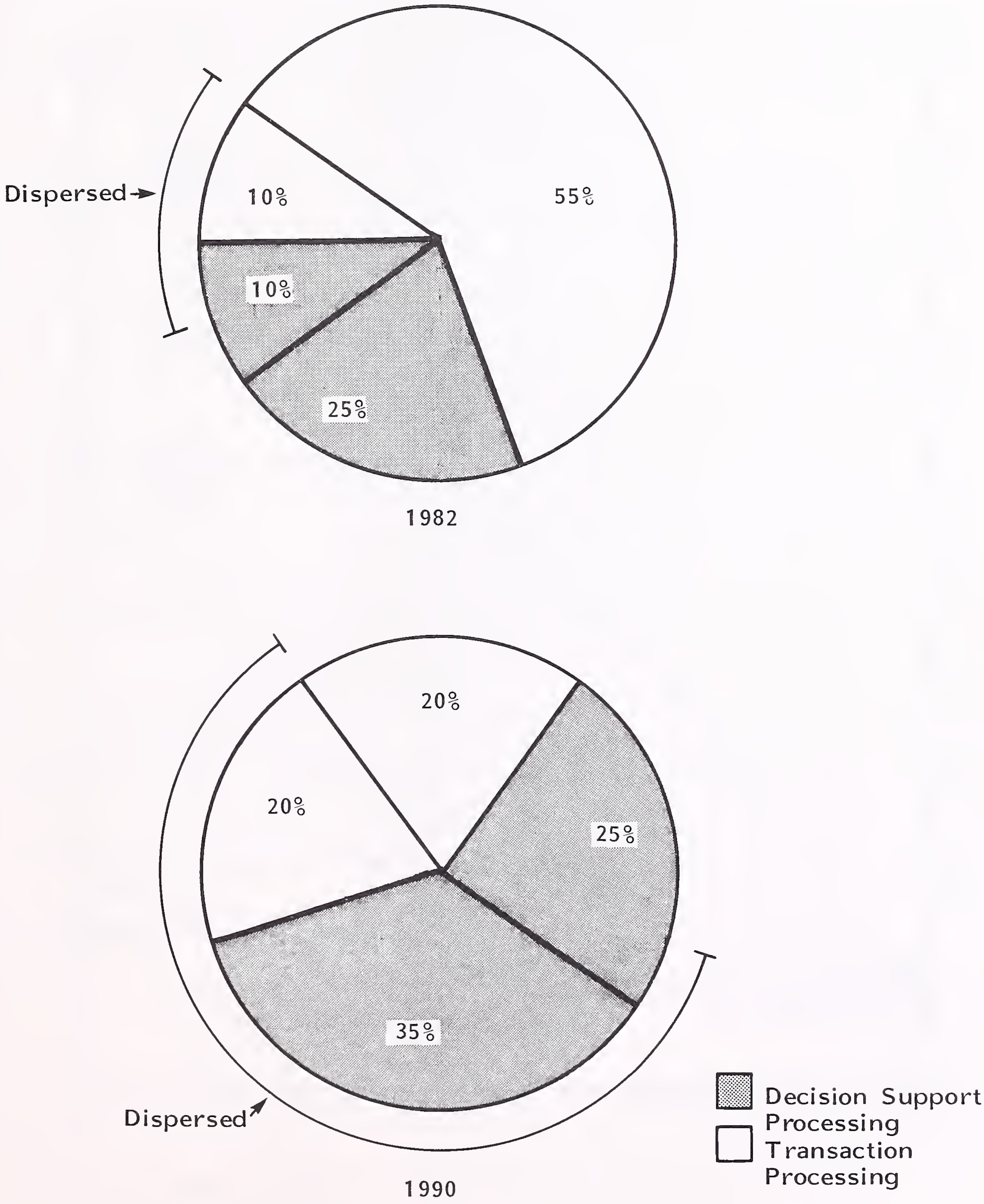
- It should be remembered that the overall "pie" will have grown by a factor of 10 in the same period. All segments of processing will have grown, although at much different rates, as shown in Exhibit I-15.

- Using all processing in 1982 as a baseline of 1.0, Exhibit I-16 shows what the relative amount of processing will be in 1990 for each segment and by what factor the processing workload will have increased.

  - The lowest, centralized transaction processing, will have increased by a factor of four (with all centralized processing increasing by a factor of six).

EXHIBIT I-14

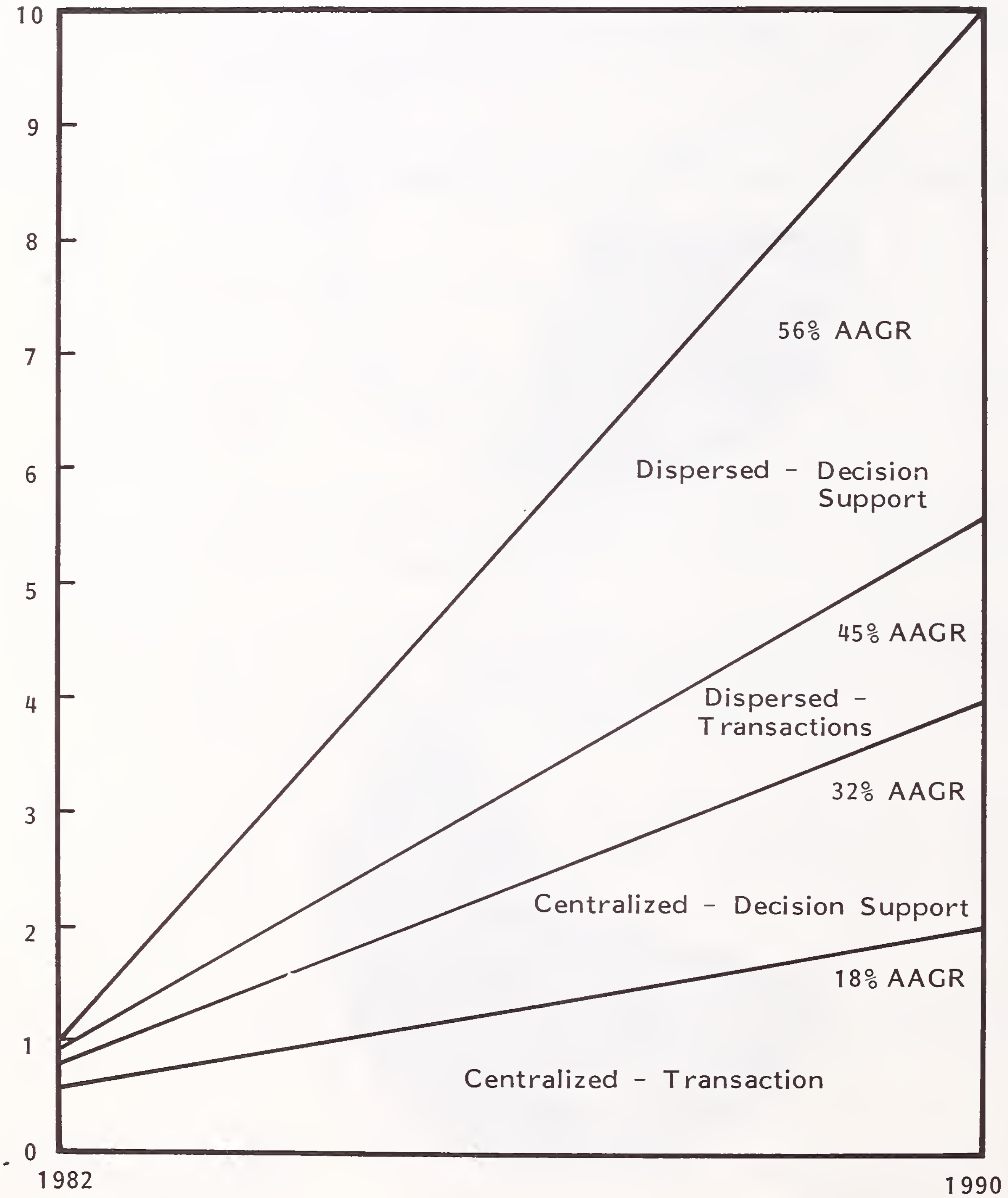
CHANGES IN PROCESSING FOCUS: 1982-1990



SOURCE: INPUT Forecasts

EXHIBIT I-15

INCREASE IN PROCESSING
BY PROCESSING TYPE: 1982-1990



SOURCE: INPUT Forecasts

EXHIBIT I-16

DISTRIBUTION OF PROCESSING BY PROCESSING TYPE: 1982-1990

TYPE OF PROCESSING	RELATIVE AMOUNT OF PROCESSING*		FACTOR INCREASE
	1982	1990	
Centralized	0.80	4.5	X 6
Transaction	0.55	2.0	X 4
Decision Support	0.25	2.5	X 10
Dispersed	0.20	5.5	X 28
Transaction	0.10	2.0	X 20
Decision Support	0.10	3.5	X 35
Total Transaction	0.65	4.0	X 6
Total Decision Support	0.35	6.0	X 17
GRAND TOTAL	1.0	10.0	X 10

* Total processing in 1982 = 1.0

SOURCE: INPUT Forecasts

  - Dispersed decision support processing will have increased by a factor of 35 (not unreasonable, given the expected penetration of personal computers alone in large organizations in the next few years).

- By this analysis, the data processing world will be turned upside down for many organizations in the next decade. This revolution will happen gradually, though. Many organizations will not be fully cognizant of its effects (both good and bad) until it is too late to greatly influence matters.

  - Personal computers will be a significant component of this change. INPUT's report, Personal Computers in the Information Systems Strategy, December 1982, describes the steps that IS management ought to take to help their organization harness the good in personal computers and avoid much of the bad.

- At the same time that the relative (not absolute) position of centralized transaction processing is changing, the focus of many of its key aspects will also be changing. The property insurance industry initially will be taken as an example, since several special characteristics place it somewhat in front of other industries; however, several other industries should not be too far behind for reasons explained at the end of this chapter.

- The traditional property/casualty insurance industry has relied upon independent insurance agents to serve as their primary distribution system. Agents typically do business with several, sometimes many, companies. This traditional arrangement is often called the "American Agency" system.

- For years, the American Agency system prospered. Recently, though, so-called "direct writer" companies have begun taking away considerable amounts of business from the American Agency companies. The direct writers (e.g., Allstate, State Farm) have their own, tied groups of agents who handle each company's business. Before the era of effective telecommunications, this was a marketing arrangement that gave the direct writers only a marginal economic advantage.

- However, the larger direct writers are now putting into place comprehensive on-line systems which cover most of their agents. These systems give them a real edge over their American Agency rivals:

  - Quotes and policies can be provided more quickly and completely.

  - Agents do not have to keep up with rapidly changing details.

  - Paper handling and administrative overhead can be reduced.

  - Customers can be serviced more quickly and satisfactorily.

  - Company management can be informed of underwriting trends much sooner (perhaps months sooner than even highly automated American Agency companies).

- The American Agency companies have watched these advances with almost helpless fascination.

  - American Agency companies do not "own" agents, so they cannot merely copy their competitors' on-line systems.

  - Companies that have tried putting their own terminals into agent offices discover that many agents do not want to write most of their business with a single company. Agents are, after all, the customer's agent; the agents' strength against direct writer agents is the ability to offer a selection of coverages.

  - Neither companies nor agents can afford the complexity and expenses involved in installing a terminal in an agent's office for each company an agent does business with.

- Another complicating factor is that many agents have purchased one of several dozen different turnkey systems aimed at agents. A few are sponsored by insurance companies, and some companies have established interface arrangements with some of the turnkeys with higher market share.

- The situation is quite complex. Exhibit I-17 shows possible arrangements between companies and agents. (Exhibit I-18 describes individual company and agent characteristics.)

  - The most common arrangements are those shown by company F and agent 7: strictly manual (i.e., paper or telephone) communication.

  - This is conservative, but not competitive.

- Several years ago major American Agency companies and agent associations formed a study organization (the Institute for Insurance Research) that focused on this and other industry problems.

  - A fairly obvious theoretical solution was to have an intelligent switching network to serve as an interface between companies and agents, as shown in Exhibit I-19.

  - In practice, however, this has turned into a very large undertaking. A few of the roadblocks have been:

    - Hundreds of different companies and dozens of agent turnkey systems.

    - Differing data definition and formats (although earlier industry-wide forms and policies mitigate this problem).

    - Differing hardware.

    - Differing communication protocols.

EXHIBIT I-17

CURRENT INSURANCE COMMUNICATION NETWORK EXAMPLES

(See Exhibit I-19 for description of company and agent characteristics.)

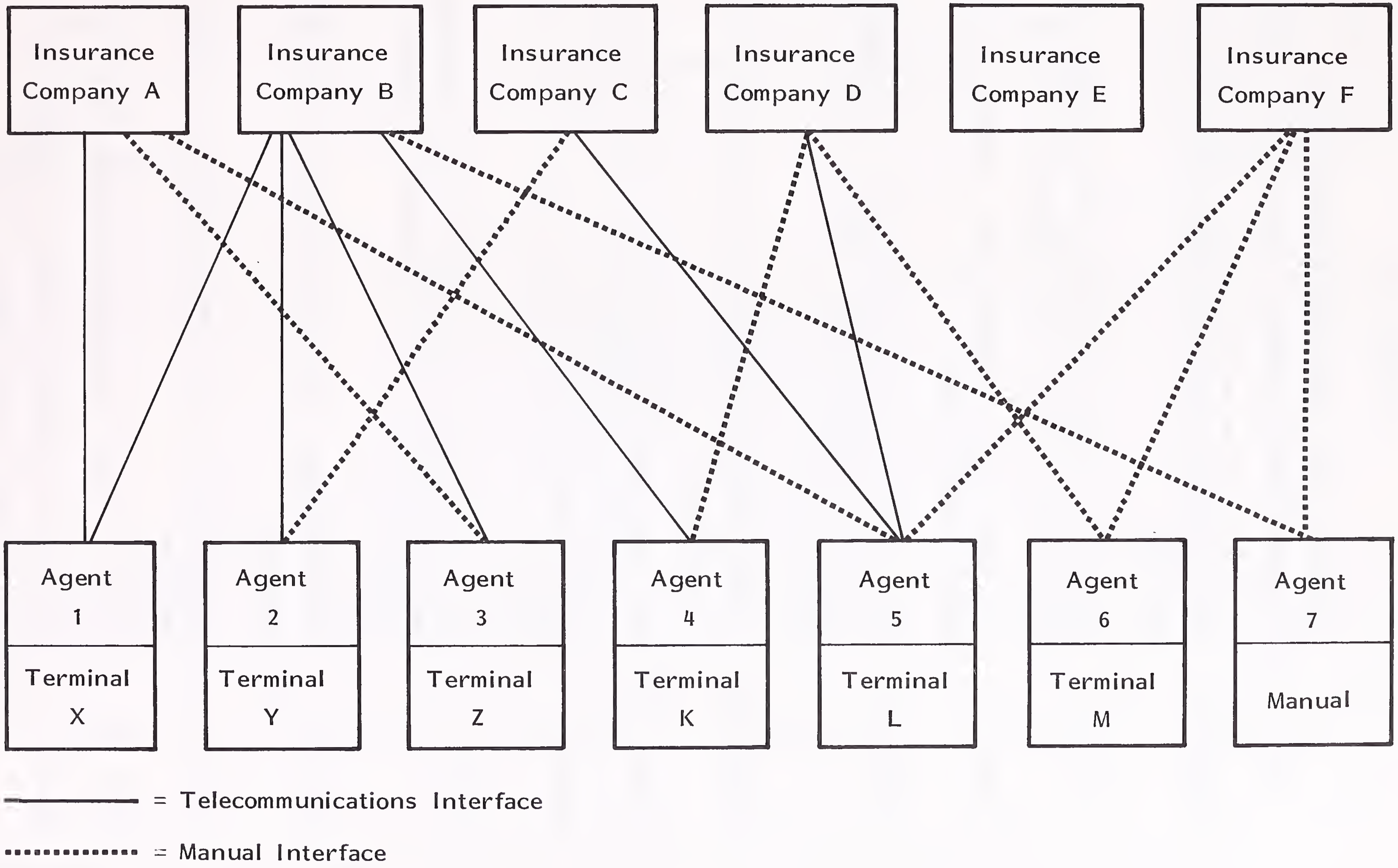


EXHIBIT I-18

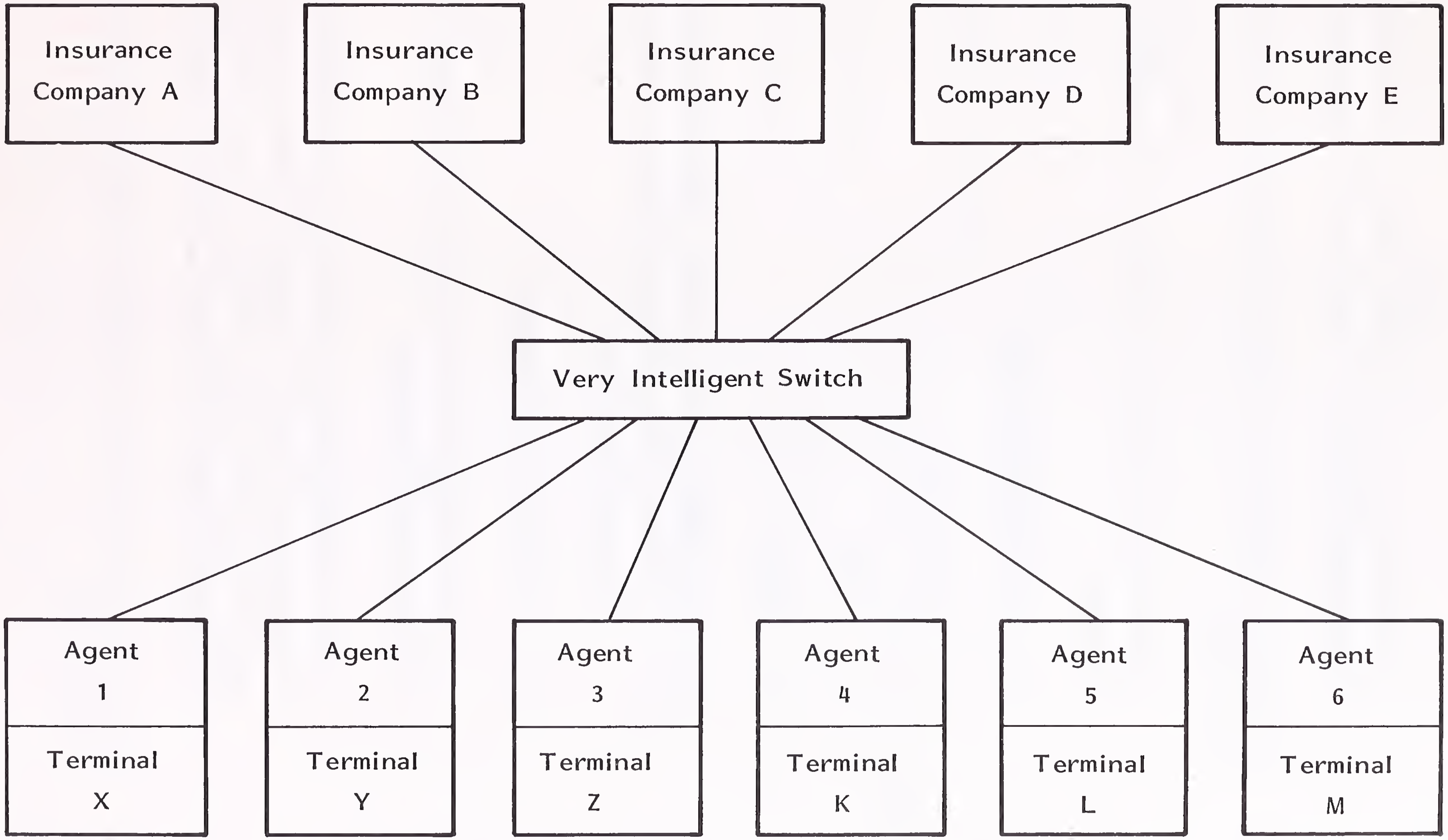
COMPANY AND AGENT CHARACTERISTICS

(For insurance communications network, see example in Exhibit I-18.)

Company A:	Only supports one kind of terminal; manual system with all others
Company B:	Supports a variety of terminals and turnkeys; must still interface manually with nonautomated agents
Company C:	Only supports one vendor's turnkey system; manual interface with all others
Company D:	Has developed in-house turnkey; will not interface with any other automated system. Dropping small agent who will not convert
Company E:	On-line system, but has never done business with any of these agents
Company F:	Batch processing; manual interface with all agents
Agent 1:	Does all business with companies supporting terminal X (rare)
Agents 2 & 3:	Have a terminal for doing business with a particular company (generally with a key company); manual for remainder
Agent 4:	Turnkey system is tied into one company; manual for remainder
Agent 5:	Turnkey tied into more than one company; manual for remainder
Agent 6:	Turnkey not tied into companies it does business with
Agent 7:	Agent has no terminal or turnkey; probably uses a batch service bureau for accounting purposes

EXHIBIT I-19

INSURANCE VALUE-ADDED NETWORK
(INSTITUTE FOR INSURANCE RESEARCH)



  - The components of the "intelligent switch" or value-added network are shown in Exhibit I-20.

- After several false starts, the Institute for Insurance Research issued an RFP in early 1982.

  - There were six finalists for setting up and running the value-added network:

    - AT&T (American Bell).

    - Control Data.

    - EDS.

    - IBM.

    - ISACOMM (a new United Telecommunications subsidiary, formerly a part of Insurance Systems of America, also acquired by United Telecomm).

    - NCSS (Dun and Bradstreet).

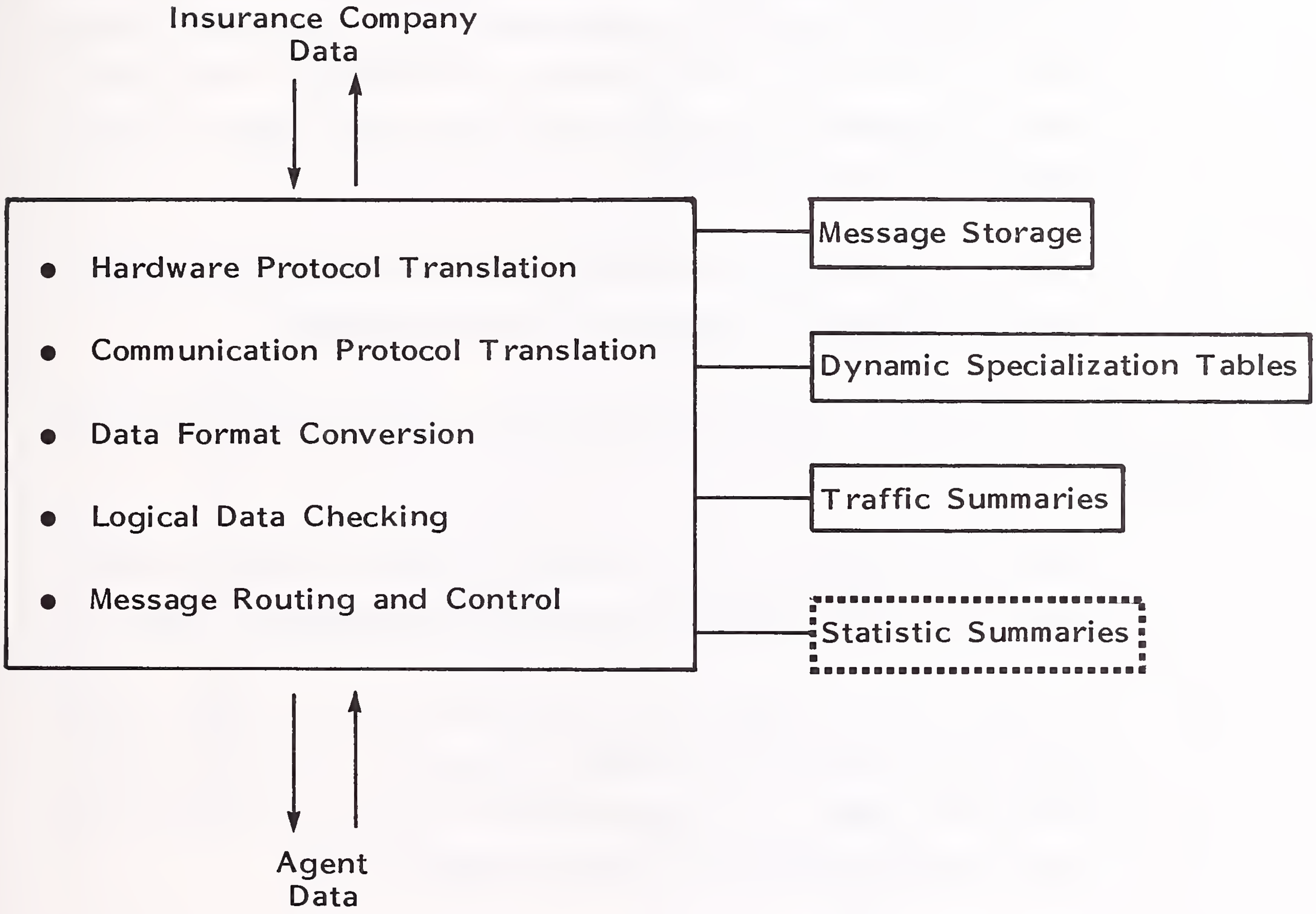
  - All finalists brought varying degrees of expertise in insurance, communications and networking.

  - AT&T and ISACOMM must have been especially disappointed when IBM was awarded the contract in September 1982: this contract would have been a big boost to either of them, and both reasonably could have believed that the proposed system was closer to their core expertise.

- IBM's name, track record and, especially, its functioning information network, carried the day.

EXHIBIT I-20

INSURANCE VALUE-ADDED NETWORK COMPONENTS



  - Until this point, IBM's Information Network had not broken any new ground.

  - Its main use by existing customers was to provide information center end-user support and program development tools. While useful, especially in a scattered, multiple-location environment, it had been a relatively expensive alternative that did not add a great deal more value than in-house solutions.

  - However, the Information Network's entry into the multifirm universe, as shown in Exhibit I-21, changed the situation markedly.

- As Exhibit I-22 shows, supplying multifirm communications is a new ball game.

  - Costs may be high, but there is no real comparison to what has gone on before, an enviable position for any vendor, but especially for IBM.

  - Assuming that the system works (and there are few technical roadblocks that hard work and attention to detail will not solve), the value added will be high: it is no exaggeration to say that it could right the current competitive imbalance in the insurance industry.

- IBM will be in the catbird seat in all of this:

  - It will have triumphantly entered a new market area.

  - It will have stolen a march on its competition both from a technical and image standpoint.

  - It will have dealt American Bell a strategic blow.

  - It will be pursued by other industry segments.

EXHIBIT I-21

IBM INFORMATION NETWORK

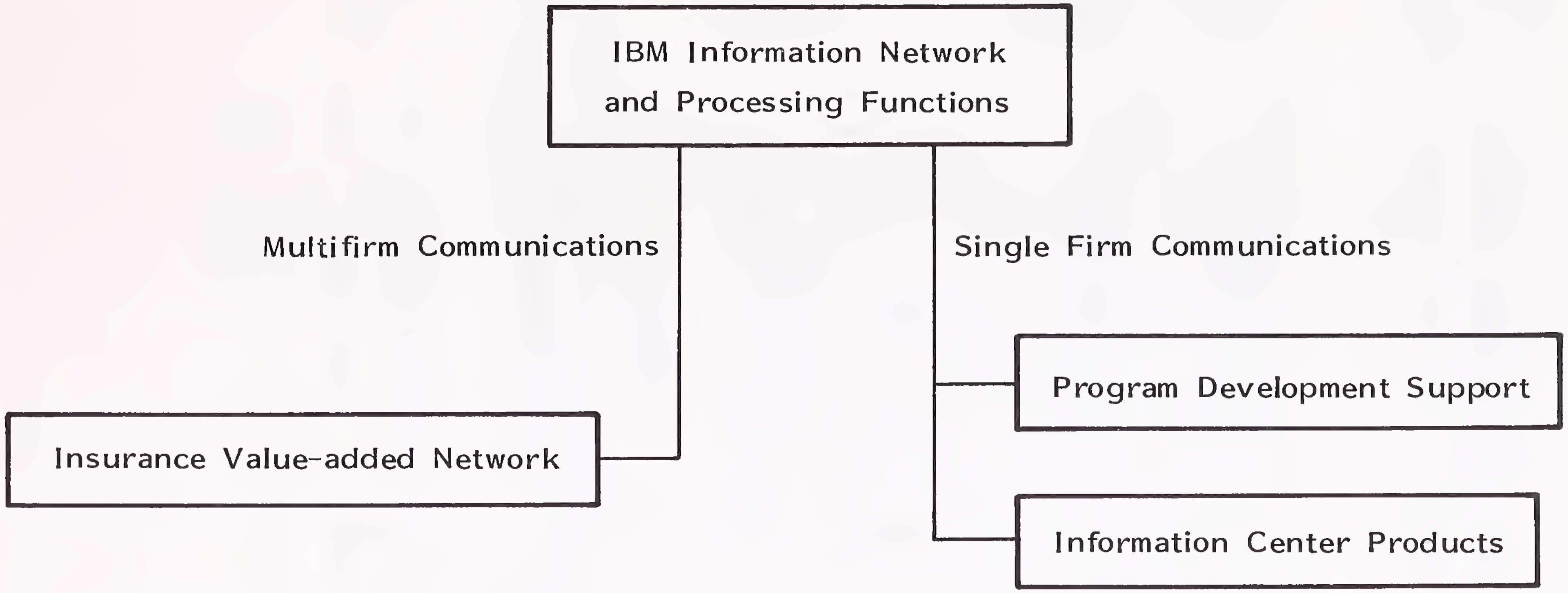

IBM Information Network and Processing Functions
Multifirm Communications
Single Firm Communications
Insurance Value-added Network
Program Development Support
Information Center Products

EXHIBIT I-22

IBM INFORMATION NETWORK - DIFFERENCE IN SINGLE AND MULTIFIRM FOCUS

CHARACTERISTIC	MULTIFIRM COMMUNICATIONS	SINGLE FIRM COMMUNICATIONS
Type of Functions Supported	Direct, Mainline Business Function	Staff Functions (Analysis, System Development)
Novelty of Application	High	Low
Effect of Application	Discontinuing, Could be Large	Incremental, Usually Small
Risk to Vendor and Customer	Medium to High	Low
Expense (Compared to Alternatives)	Not Comparable	High
Value-added	Very High	Medium

- Banking will soon be entering a similar crossroads to that of insurance:

  - Nonbanking financial institutions (e.g., American Express, Merrill-Lynch) are entering the banks' retail markets.

  - New kinds of banking products are changing relationships between banks.

  - The legal strictures preventing national retail banking are dissolving.

  - Individual banks are setting up their own teller, cash machine, and experimental home-banking networks.

- Few, if any, individual banks will be able to have complete regional, let alone national, terminal networks. The ideal would be competing consortiums of banks that share one another's networks (or share standalone terminals). This would be analogous to the way bank cards have evolved.

  - Exhibit I-23 sketches what a value-added banking network would consist of.

  - Already computer service vendors, the bank card processors and some of the leading banks are beginning to see themselves as playing the pivotal switch role.

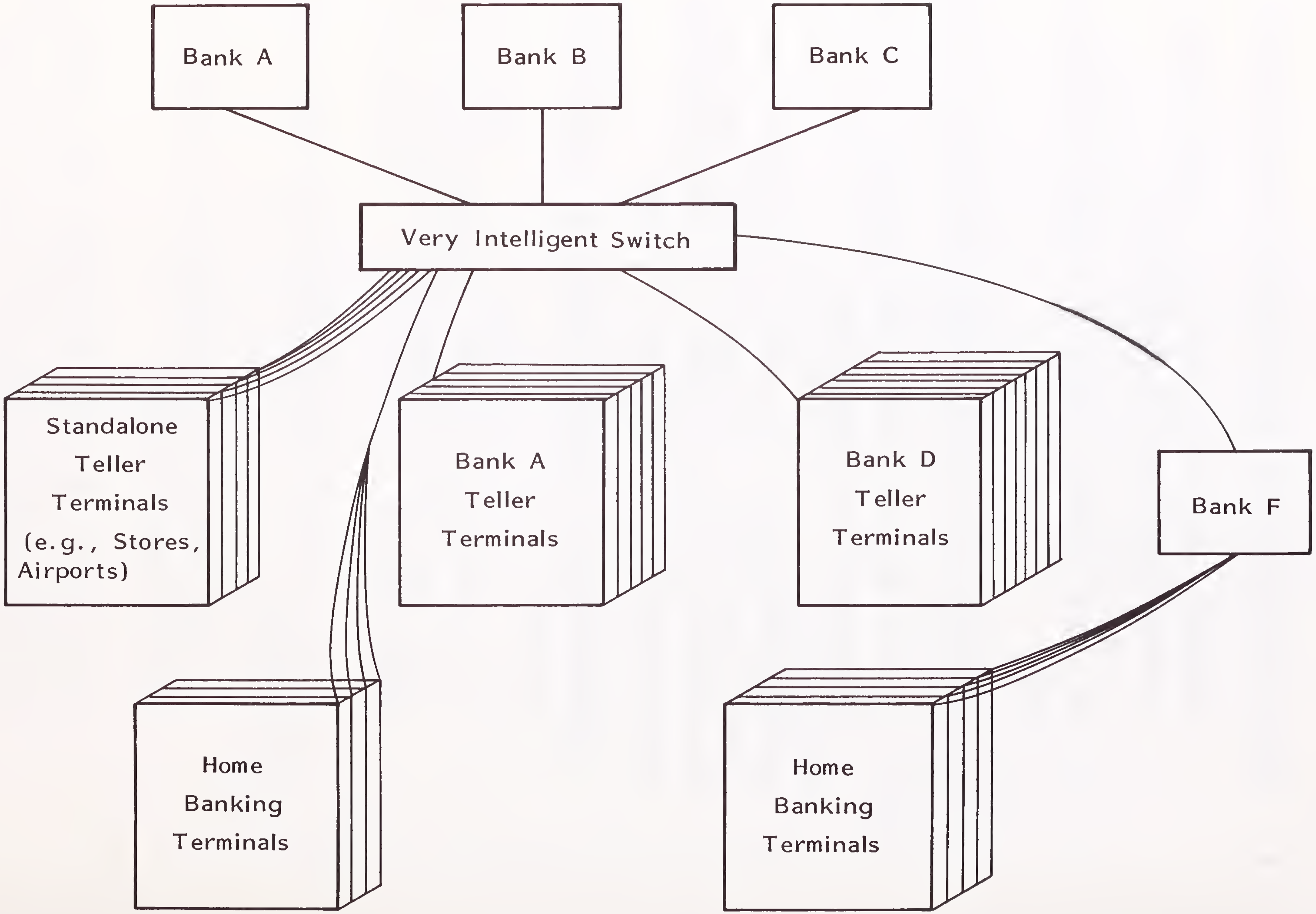
- Health insurers and hospitals have experimented with similar systems using earlier technology.

  - The need is substantial, outside pressures are increasing, and there is a history of cooperative efforts.

  - However, there have been so many divergent political forces operating with changes in administrative direction that the time may not be ripe for interorganization communications for several more years.

EXHIBIT I-23

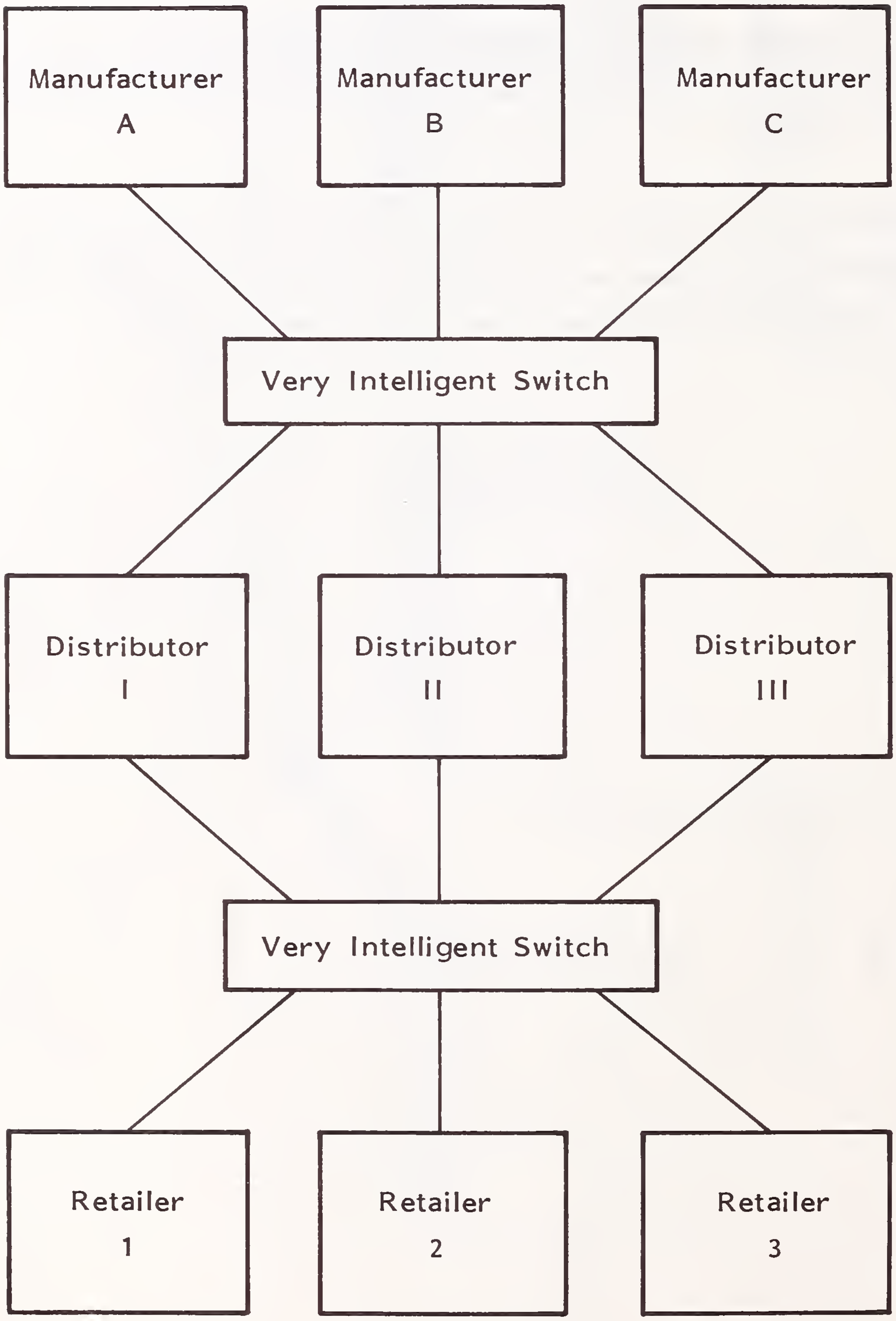
VALUE-ADDED BANKING NETWORK



- Manufacturers and distributors could take advantage of the same sort of technology as schematicized in Exhibit I-24.
    - However, the outside pressures are not as great for the setting up of such a network.
    - Equally important, unlike insurance and banking, there is much less of a tradition of industry-wide cooperation in setting up joint projects and systems.
- IBM will be a powerful "sponsor" for intercorporate data processing. IBM's position may well become the catalyst in areas such as banking where most of the necessary preconditions for success are already in place.

EXHIBIT I-24

VALUE-ADDED DISTRIBUTION NETWORK



II CROSS INDUSTRY ANALYSIS

II CROSS-INDUSTRY ANALYSIS

A. INTRODUCTION

- This chapter summarizes the annual survey findings of 564 IS organizations. Where appropriate, information is broken down by company size groups or industry sectors. See Appendices A and B for a copy of the questionnaire and a breakdown of the sample by industry and organization size.

- This chapter is organized into the following sections:

  - IS budgets.

  - IS staffing.

  - IS planning issues.

  - Personal computers.

- Personal computers are addressed separately because they are the most dynamic example of end-user dispersed computing.

B. INFORMATION SYSTEMS BUDGETS

- Only 61% of firms surveyed expected to see an increase in their IS budget in 1983, as shown in Exhibit II-1. Overall, the average change in IS budgets will be a 9% increase.

    - For most of the largest firms (i.e., those over $1 billion), the alternative to an increase is no change, i.e., keeping the same budget as in 1982.

    - However, for smaller firms (or corporate divisions with their own IS budget), about 10% expect an actual budget decrease.

- The average rates of budget change vary considerably by sector around the overall average of 9%, as shown in Column C in Exhibit II-2, from a low of under 6% for process manufacturing to almost 15% for banking and finance. This reflects events occurring in each sector:

    - Process manufacturing (e.g., chemicals, oil) has seen a signficant drop in their overall business in 1982 because of the oil glut.

    - Banking and finance, still relatively profitable, is faced with many new business pressures that will require expanded computer-based systems to remain competitive.

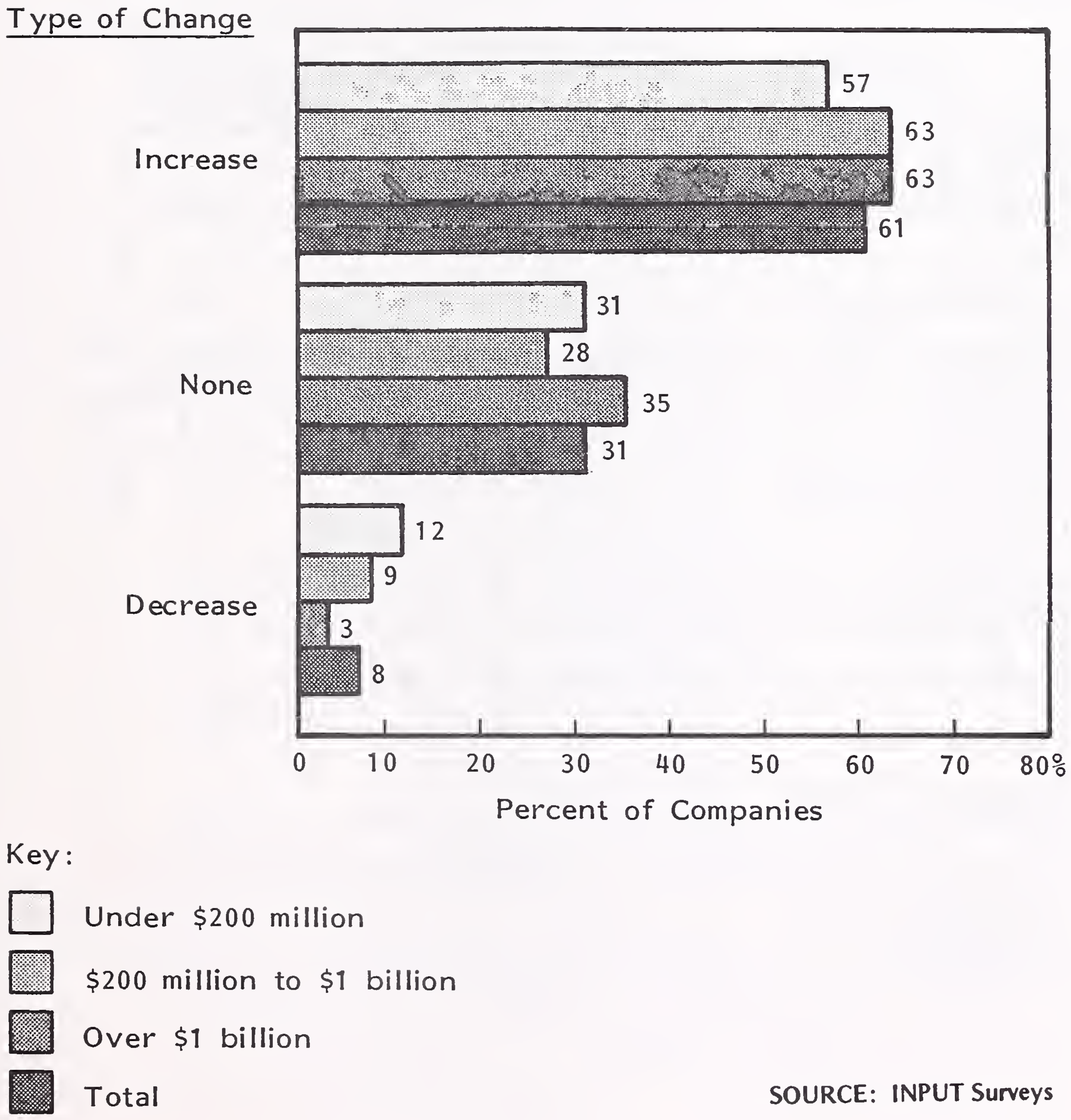
- All except the following three sectors expect a drop in the budget increase for 1983:

    - Transportation, whose rate of growth had already declined in 1982.

    - Services, much of whose growth is fueled by the computer service industry itself.

EXHIBIT II-1

AVERAGE ANTICIPATED BUDGET CHANGE FOR 1983, BY COMPANY SIZE



SOURCE: INPUT Surveys

EXHIBIT II-2

INFORMATION SYSTEMS BUDGETS: EXPECTED INCREASES, 1980-1983

INDUSTRY SECTOR	A EXPECTED INCREASE FOR 1981	B EXPECTED INCREASE FOR 1982	C EXPECTED INCREASE FOR 1983
Discrete Manufacturing	+13.2%	+16.9%	+ 6.7%
Process Manufacturing	+11.1	+14.5	+ 5.9
Transportation	+16.1	+ 9.2	+12.3
Utilities	+12.7	+15.8	+ 6.9
Banking/Finance	+ 9.2	+17.0	+14.6
Insurance	+ 7.9	+11.8	+ 8.2
Distribution	+10.2	+12.3	+ 8.5
Education	+ 4.4	+ 6.4	+11.7
Government	+ 7.4	+11.3	
Service and Other	+11.0	+11.9	+15.6
Averages for all Services	+11.8%	+14.8%	+ 9.1%

SOURCE: INPUT Surveys

  - Education and government, which are shielded from the full rigors of the economy.

- Exhibit II-3 shows these comparative rates of change another way: the proportional increase or decrease in the budget from one year to the next (e.g., if the rate of increase was 10% in year one and 13% in year two, the change in the growth rate change would be +30%; if it were 7% in year 2, the growth rate change would be -30%).

  - The biggest losses by far for 1983 are in discrete manufacturing (-60%), process manufacturing (-59%), and utilities (-56%). This is a direct reflection of the financial difficulties and uncertainties now facing these industries.

- Not all budget categories will be growing at the same rate. Spending on personnel is expected to grow at 8%, while the rate of increase on mini and microcomputers will be more than three times as high, as shown in Exhibit II-4.

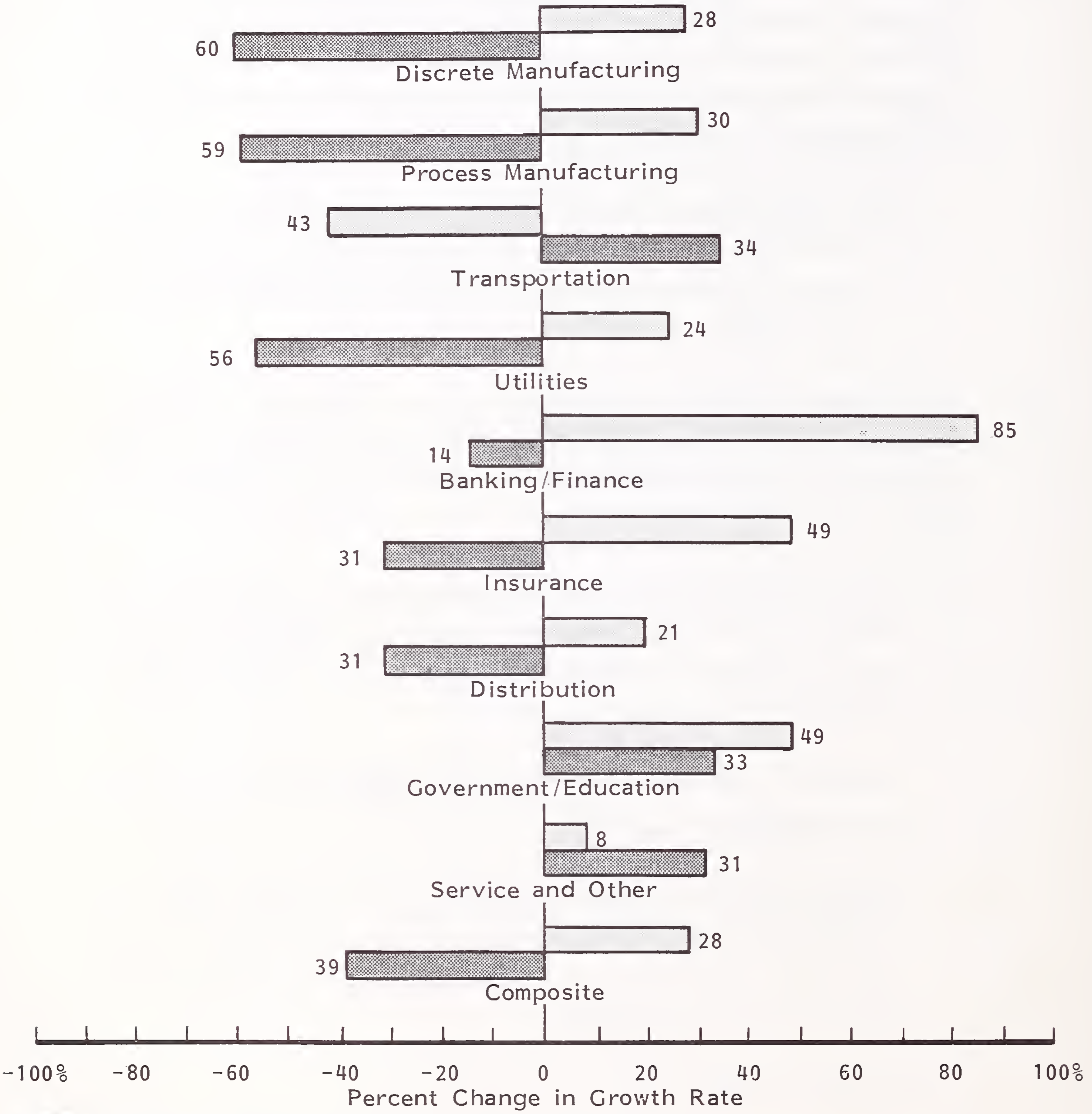
  - Microcomputer spending will, in fact, be growing at a much higher rate even than this since so much of the spending is taking place outside of the IS department. (Section F of this chapter will analyze these personal computer trends.)

  - Terminals, communications, and software are other areas expecting higher than average growth.

  - Outside processing services is the only area in which expenditures are expected to decline. Although the increased use of personal computers will affect timesharing, the forecast decline should be taken with a grain of salt for two reasons:

EXHIBIT II-3

RATES OF CHANGE IN BUDGET GROWTH BY INDUSTRY SECTOR



☐ Change in budget growth rate from 1981 to 1982

▨ Change in budget growth rate from 1982 to 1983

SOURCE: INPUT Surveys

EXHIBIT II-4

1982 BUDGET DISTRIBUTION AND 1982/1983 CHANGES

BUDGET CATEGORY	PERCENT OF I.S. BUDGET (1982)	EXPECTED CHANGE 1982 to 1983
Personnel	46%	8%
Hardware		
Mainframe	17	7
Mini/Microcomputer	1	29
Terminals	3	14
Peripherals	5	6
Communications	6	14
Software and Services		
Software	3	19
Processing Services	1	- 10
Software Maintenance	2	9
Hardware Maintenance	4	8
Other	12	9
Total	100%	9%

SOURCE: INPUT Surveys

        - This has been expected by IS managment in prior years and has not occurred.

        - Like personal computer spending, most timesharing spending takes place outside the control of (and often the knowledge of) IS departments.

- Exhibit II-5 shows the range of ratios between IS budgets and company revenues for commercial organizations by size of company (or independent division).

    - The IS percentage of total revenues for the average company (as measured at the 50% mark) in each size group was:

        - For large companies (i.e., over $1 billion in revenues): 0.55%.

        - For medium-sized companies (i.e., between $200 million and $1 billion): 0.8%.

        - For small companies (i.e., under $200 million): 1.2%. (Note: the banking and finance sector was omitted from this exhibit because their corporate base used for comparisons is assets, not revenues).

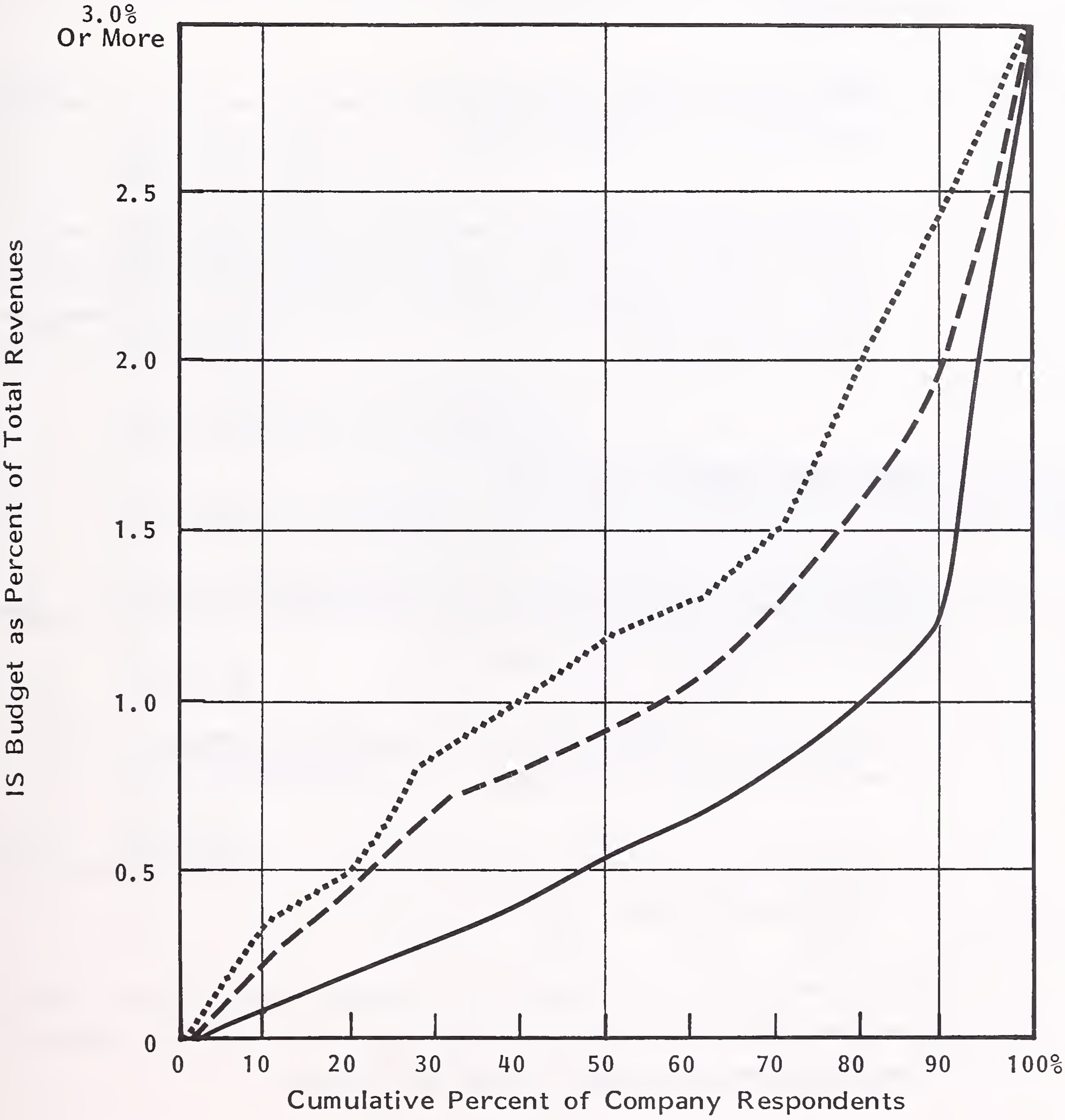
- However, averages do not tell the whole story.

    - The lowest 10% of companies spend between 0.1% and 0.4%, depending on their size, while the top 10% spend 1.5% or more.

    - This variation is due to a combination of the extent of automation, spending patterns (e.g., lease versus purchase), budgeting practices, and degree of centralization.

EXHIBIT II-5

INFORMATION SYSTEMS BUDGET AS A PERCENT OF TOTAL REVENUES, BY COMPANY SIZE



Note: Banking and Finance Sector Not Included

Key: Company Size = •••••• Under $200 million, — — $200 million to $1 billion,
——— Over $1 billion

SOURCE: INPUT Surveys

  - Budgeting conventions will become even more of an issue in future years as end-using computing increases in importance and users assume more direct control of computing budgets.

- Taking the median amount, firms spend about $900 on IS for every corporate employee, as shown in Exhibit II-6. There are wide variatons by industry sector, however.

  - Distribution and government/education spend appreciably less, reflecting their low levels of automation.

  - Insurance and banking/finance spend much more than average, reflecting both their long-standing automation as well as, in the case of insurance, the distribution network not being part of the corporate entity, in most cases.

C. INFORMATION SYSTEMS STAFFING

- Expected changes in IS staffing to a large extent mirror the budget changes previously discussed, as shown in Exhibit II-7.

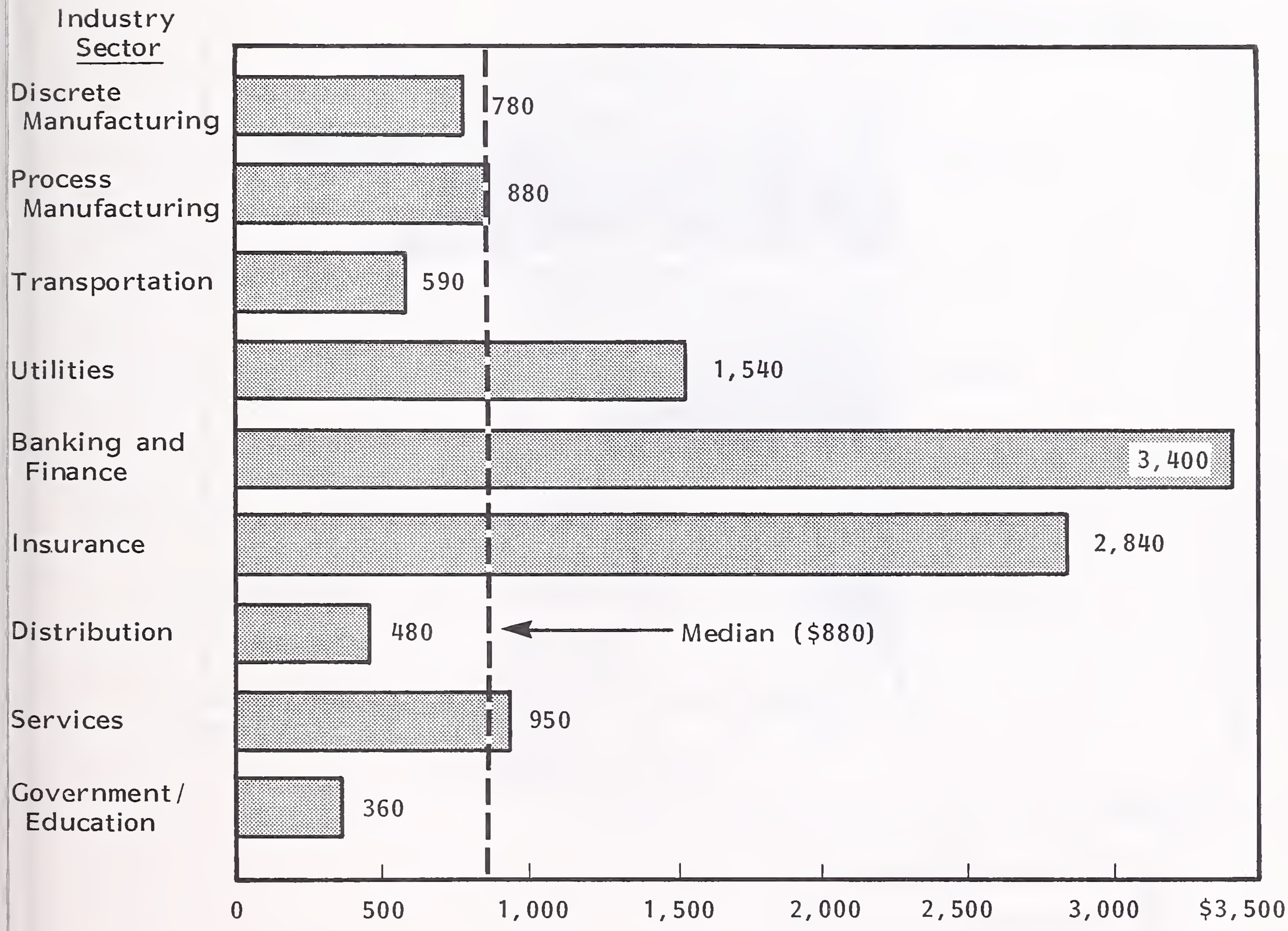
  - On the average, 58% of firms expect to add staff (compared to the 61% which see an increase in budget).

  - Large firms are somewhat more likely to decrease their IS staff than decrease their budget.

- Staff turnover is less of a problem than in previous years, largely because of the economy. The average turnover rate is now 12%, as shown in Exhibit II-8. Even programmer and analyst turnover is only 14%.

EXHIBIT II-6

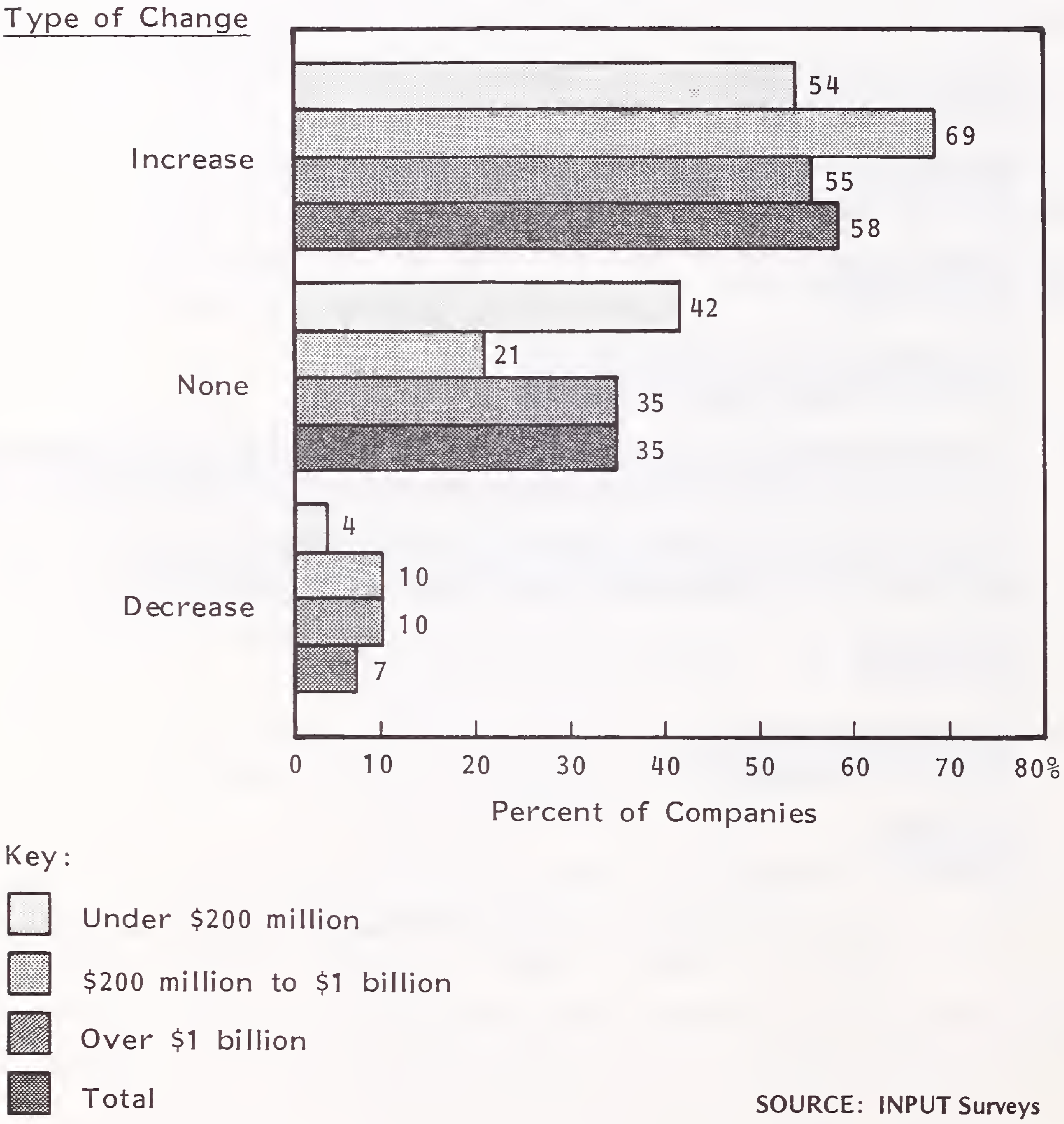
INFORMATION SYSTEMS SPENDING PER CORPORATE EMPLOYEE - BY INDUSTRY SECTOR



SOURCE: INPUT Surveys

EXHIBIT II-7

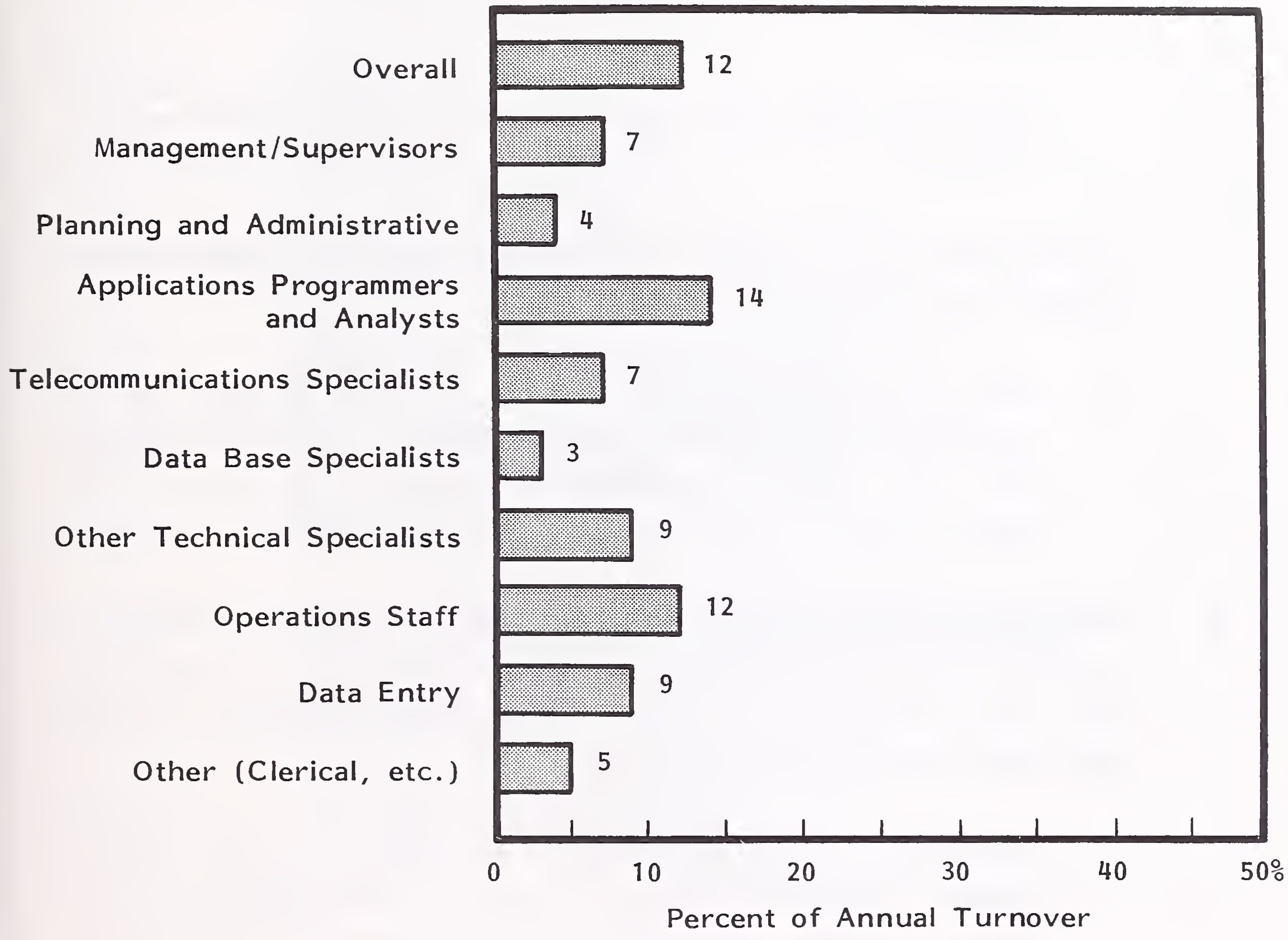
INFORMATION SYSTEMS STAFFING CHANGES EXPECTED IN THE NEXT TWELVE MONTHS, BY COMPANY SIZE



SOURCE: INPUT Surveys

EXHIBIT II-8

INFORMATION SYSTEMS TURNOVER BY POSITION



SOURCE: INPUT Surveys

- Turnover varies by industry sector, as is shown in Exhibit II-9. Taking 100 as average turnover, utilities, banking/finance and distribution all expect to see significantly higher turnover than average in the future.

- Although turnover is down, IS departments still foresee a high degree of difficulty in recruiting specialized technical staff, as shown in Exhibit II-10.

  - Application programmer recruitment is expected to be almost as difficult.

  - Nontechnical staff recruitment is expected to be relatively easy by comparison.

- For the most part the difficulty in recruitment does not vary appreciably by company size, as shown in Exhibit II-11.

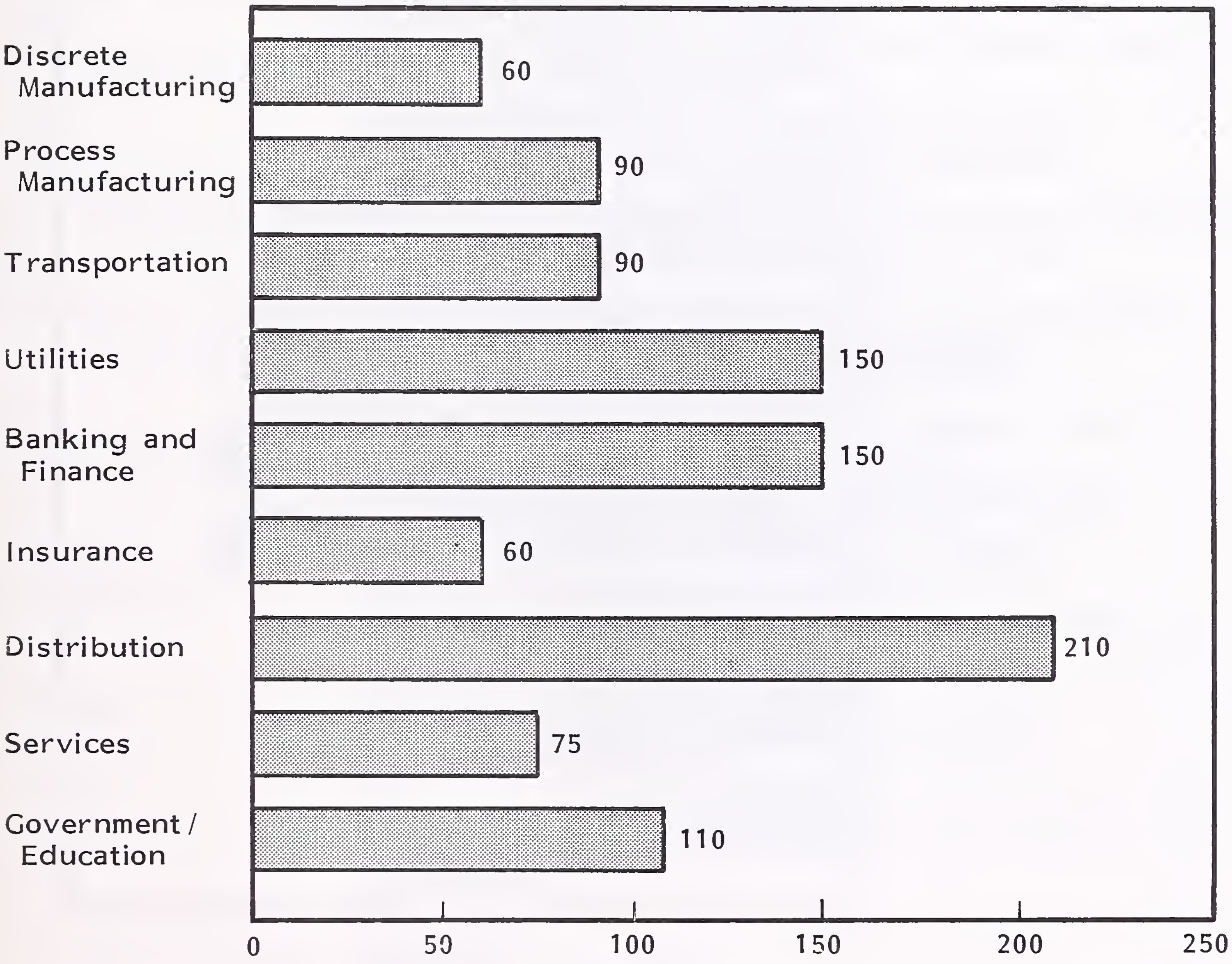
  - Note, though, the significant difficulties that large companies see in recruiting telecommunications and data base specialists. This reflects the very complex operating environments of these large organizations: they need very highly qualified specialists.

- There are industry differences in the difficulty of recruiting staff, as shown in Exhibit II-12. This is a result of a combination of factors, including local labor pools, company/sector financial condition, "leading edgeness," wage scales, department/company growth, etc.

  - Recruitment is significantly easier in the services and transportation industry. The services industry record is greatly influenced by the computer services component, which is both dynamic and technically attractive. Transportation offers some technical challenges also; equally important is the prospect of greatly reduced personal travel costs in the airline subsection.

EXHIBIT II-9

INFORMATION SYSTEMS STAFF RELATIVE TURNOVER, BY INDUSTRY SECTOR

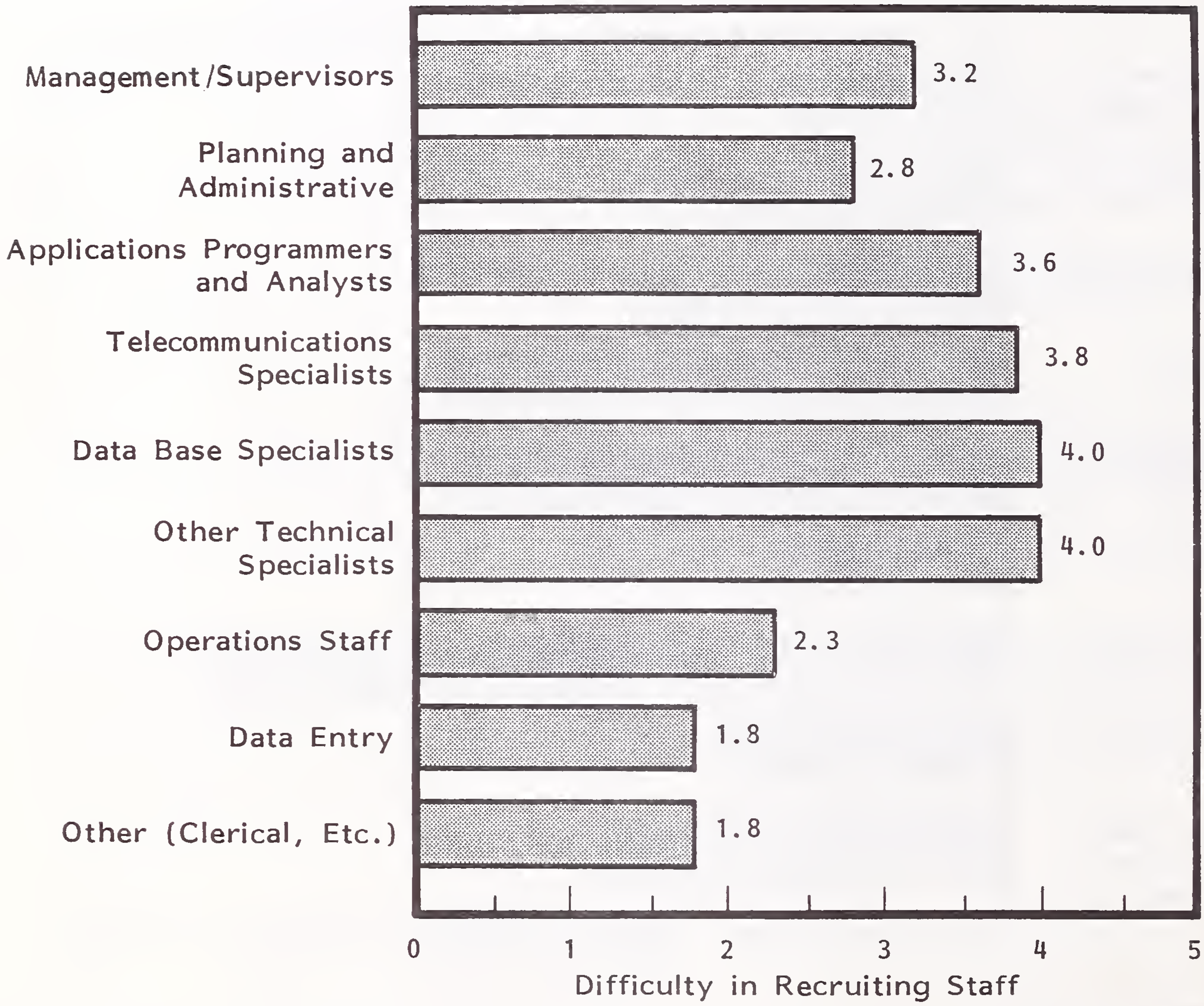


Average Turnover = 100

SOURCE: INPUT Surveys

EXHIBIT II-10

DIFFICULTY IN RECRUITING STAFF - BY POSITION

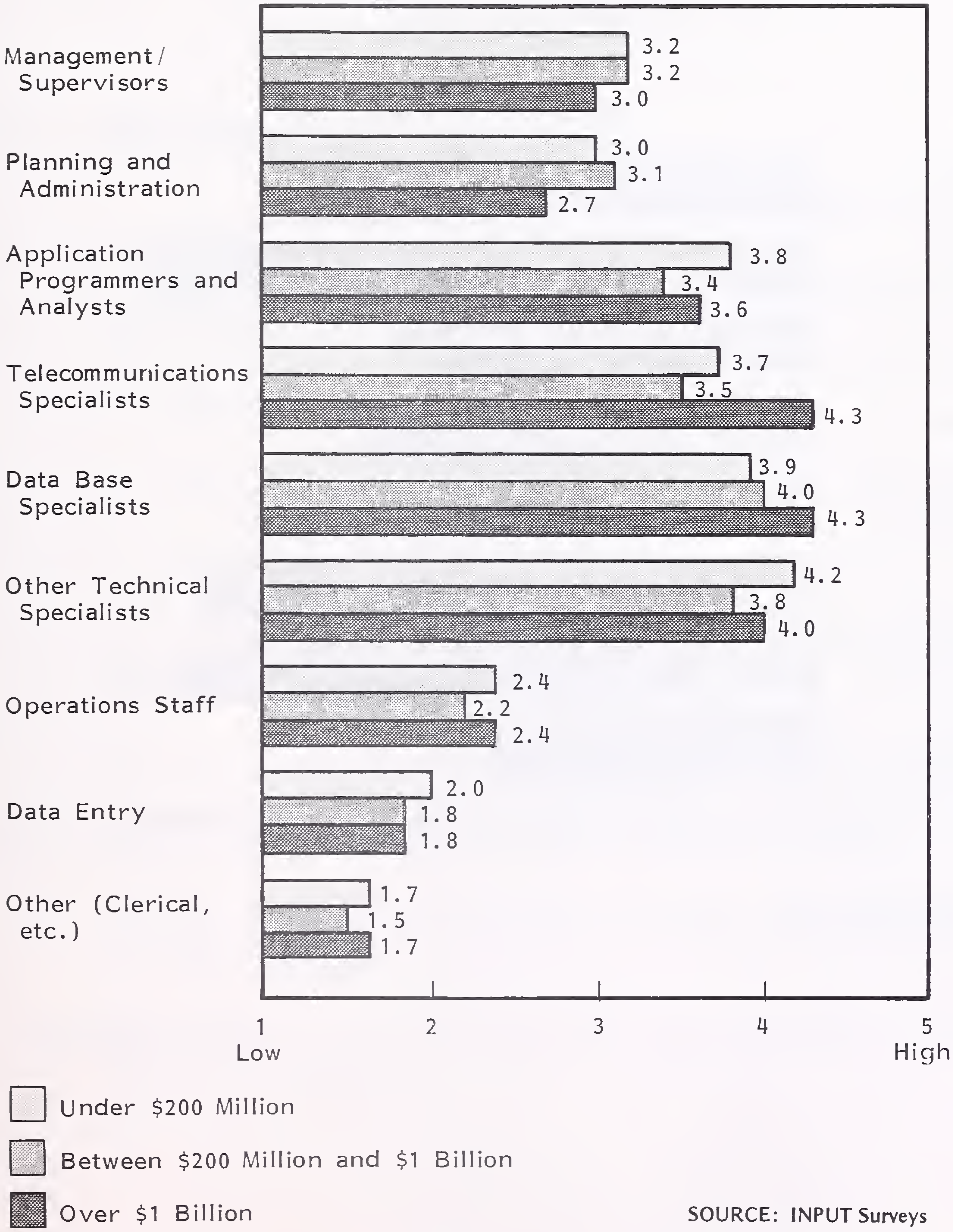


Scale: 1 = Low, 5 = High

SOURCE: INPUT Surveys

EXHIBIT II-11

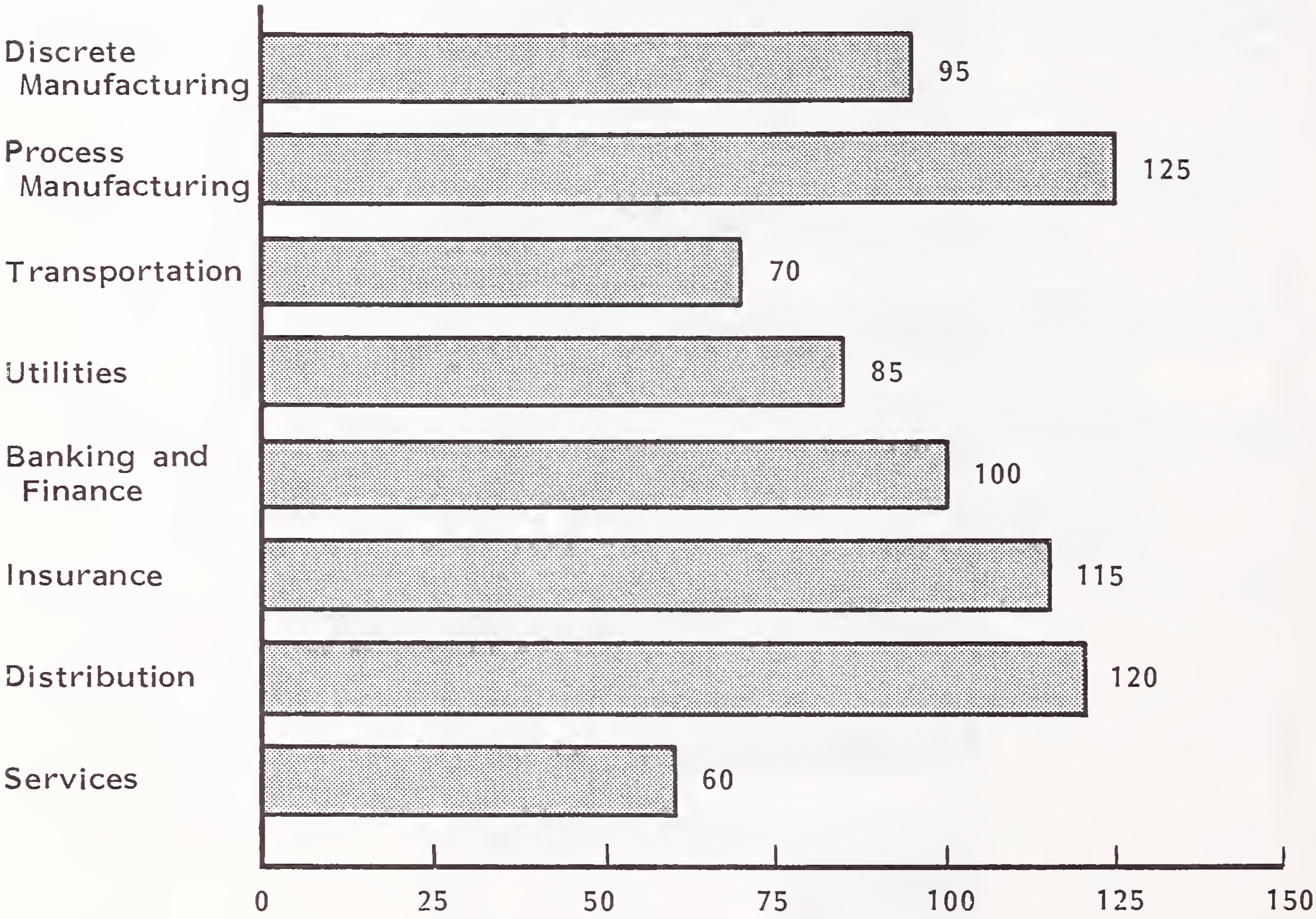
DIFFICULTY IN RECRUITING STAFF, BY POSITION TYPE AND COMPANY SIZE



SOURCE: INPUT Surveys

EXHIBIT II-12

RELATIVE DIFFICULTY IN RECRUITING STAFF, BY INDUSTRY SECTOR



Average Difficulty = 100

SOURCE: INPUT Surveys

- Certainly an influential factor in recruitment of applications staff is whether work will be on new developments or mainteance (see INPUT's Management Issue Report, Software Maintenance: The Uninvited Guest, November 1982). For better or worse, maintenance is expected to remain stable, at a little less than half the workload, for the 1981-1983 time period, as shown in Exhibit II-13.

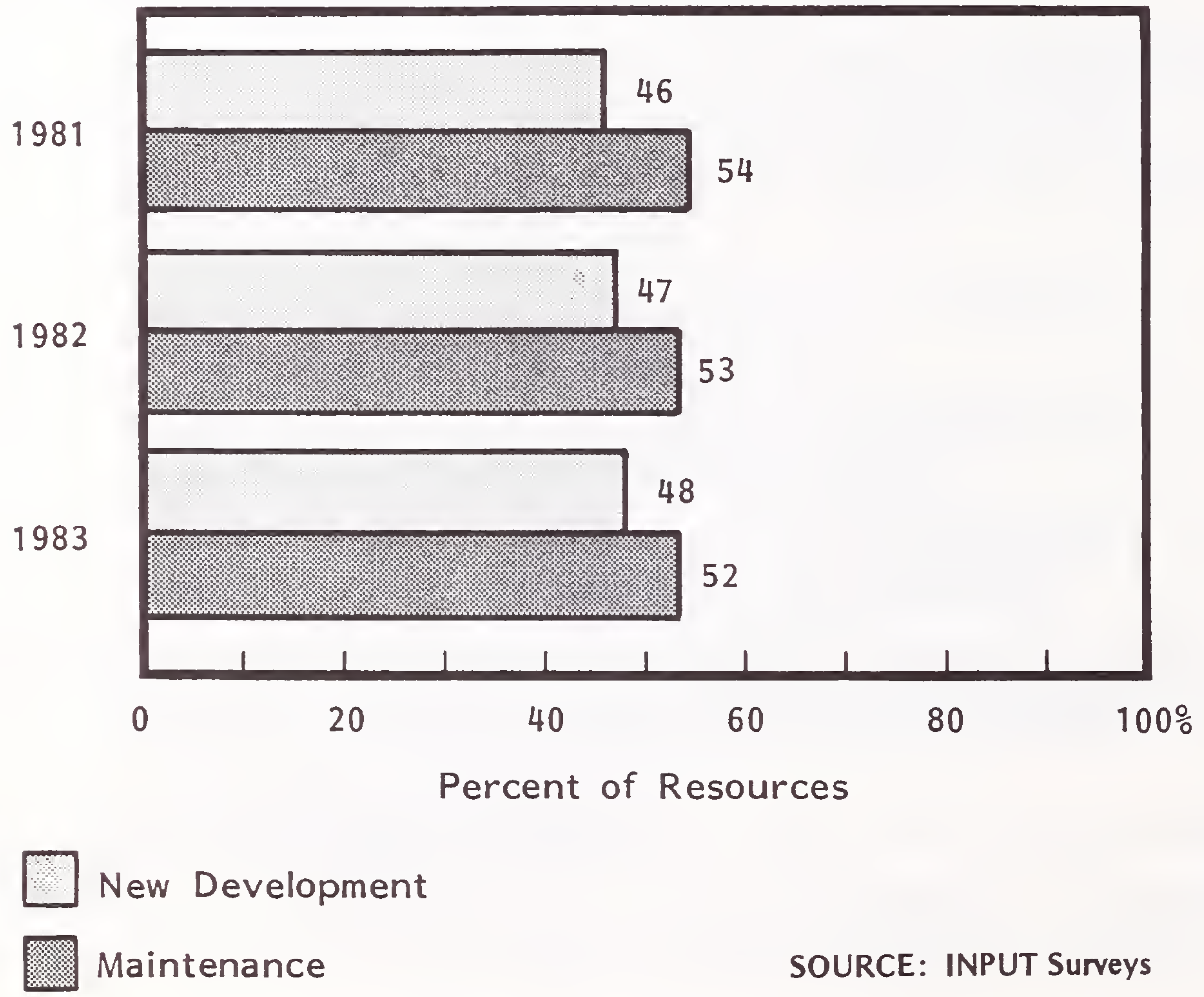
D. INFORMATION SYSTEMS PLANNING ISSUES

I. ISSUE TYPES

- There are three types of issues which affect IS plans:
  - Problems.
  - Objectives.
  - Initiatives.
- "Problems" are self-explanatory; they may be internal or external, technical or managerial.
- "Objectives" are the goals that IS is heading toward. An objective may exist because of a problem (e.g., improve user relations) or may exist in the absence of a precipitating problem (e.g., develop an office automation plan).
- "Initiatives" are actions that will be taken. Initiatives may flow from problems and/or objectives.
- Exhibit II-14 shows the logical relationships which exist between problems, objectives, and initiatives.

EXHIBIT II-13

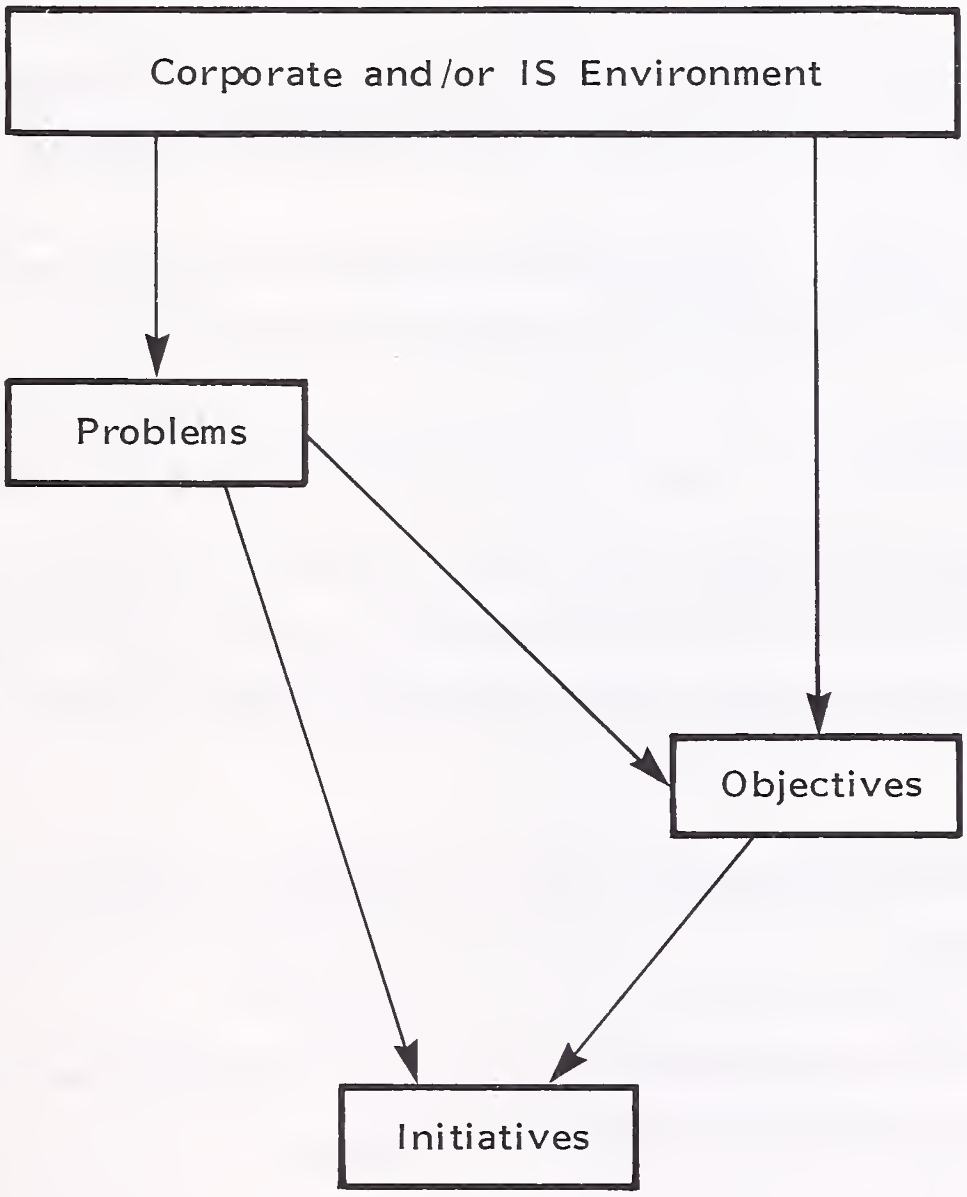
NEW PROGRAM DEVELOPMENT VERSUS MAINTENANCE, 1981-1983



SOURCE: INPUT Surveys

EXHIBIT II-14

RELATIONSHIP OF INFORMATION SYSTEMS PROBLEMS, OBJECTIVES, AND INITIATIVES



2. ISSUE GROUPS

- There are many IS issues. For purposes of analysis and presentation, they have been grouped into three issue areas and seven major issue groups. Exhibit II-15 shows these areas and groups, along with examples of the major subgroups.

- Costs and telecommunication/office automation will be specially focused on to see if their primacy in current news is reflected in IS planning.

- Several of the major subgroup issues are separately reported on and analyzed in the individual industry sector analyses in Chapter III.

3. METHODOLOGY

- Survey respondents supplied open-ended responses to questions about what they saw as the most important problems, objectives, and initiatives facing their organizations. Respondents could supply as many as three issues in each category.

  - The answers were later coded into groups and subgroups for further analysis.

- The number of subgroup responses in a particular industry sector was calculated as a percentage of all firms in the sector.

  - These subgroup percentages have been added together to obtain an index value for an issue group. For example:

    - Some IS departments have problems with both users and upper management; others have problems only with users.

EXHIBIT II-15

INFORMATION SYSTEMS ISSUE AREAS AND GROUPS

ISSUE AREA	ISSUE GROUP	EXAMPLES OF SUBGROUPS
Corporate Relationships	Same	Relations with upper management, relations with users, company objectives, end-user computing, committees
IS Management	Planning and Control	Applications planning, project control, management techniques, organizational changes
	Personnel	Shortages, turnover, training, recruitment
	Costs	Budget cuts, budget justification
Technical	Hardware	Operation, capacity management, maintenance, DDP security,
	Software	Development, maintenance, productivity, quality, packages
	Telecommunications, Office Automation	Data and voice networks, equipment planning, office system organization

  - If, for example, in the services sector, 12% of companies have problems in their relations with upper management and 20% have user relation problems, the resulting index value is 32.

4. INFORMATION SYSTEMS PROBLEMS

- The median importance of most of the problem groups is similar, as shown in Exhibit II-16.

  - However, there are usually quite large variations from the highest to the lowest industry sector.

  - Costs and telecommunications/office automation are not considered major problems. (Although, as will be seen, considerable importance is placed on telecommunications/office automation as an objective.)

- Exhibit II-17 shows the actual index values for each industry sector.

- Company/division size in some cases does have an impact on how important different kinds of problems are, as shown in Exhibit II-18.

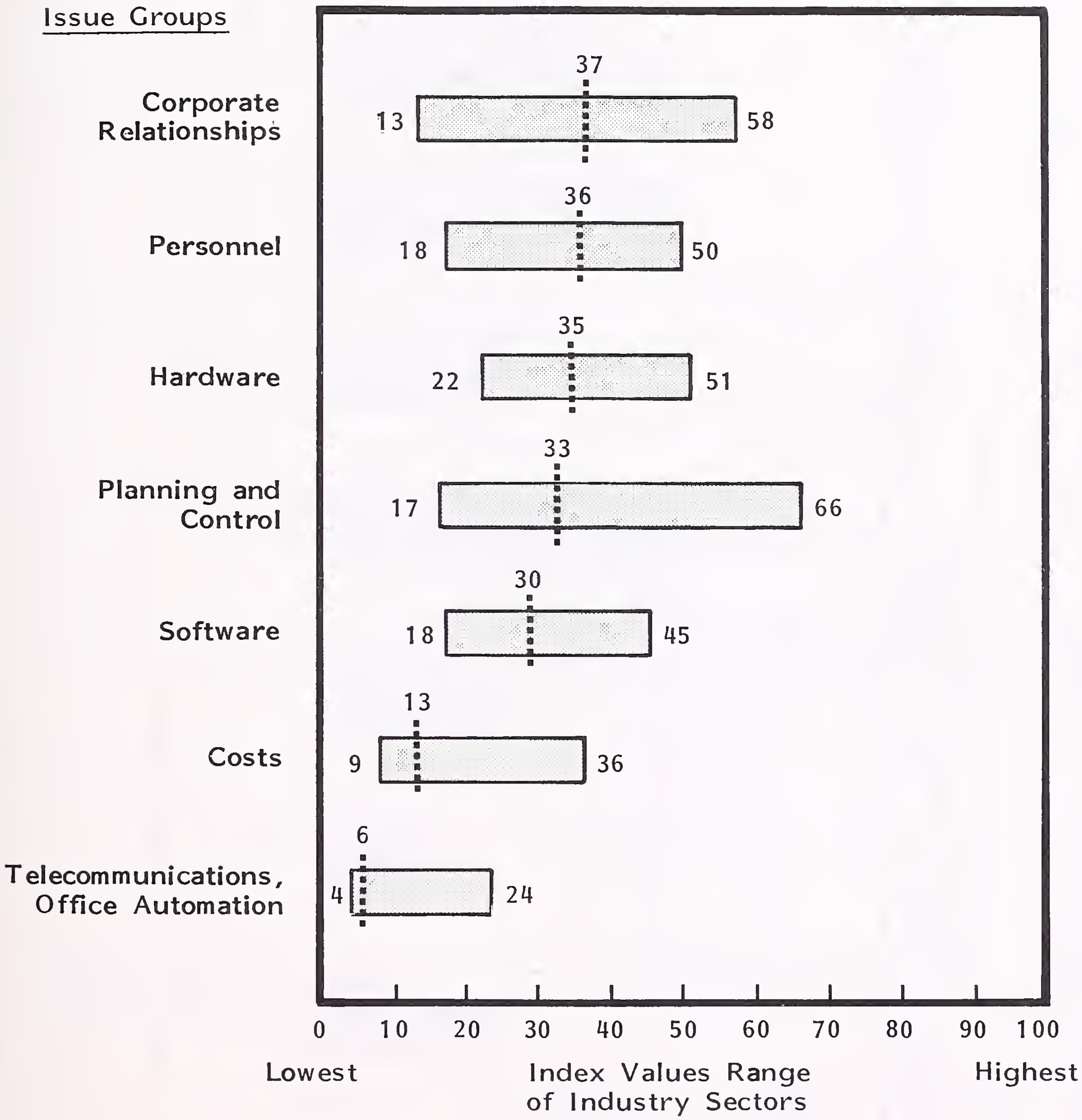
  - Large companies, not unexpectedly, have significant problems in corporate relationships and planning and control. They have fewer perceived problems in software.

  - They also have relatively more problems in telecommunications/office automation; this is a function of both their organizational complexity and being on the leading edge.

  - Medium-sized companies, in contrast, are caught in a bind on personnel issues.

EXHIBIT II-16

RELATIVE IMPORTANCE OF INFORMATION SYSTEMS PROBLEMS



.... = Median

SOURCE: INPUT Surveys

EXHIBIT II-17

RELATIVE IMPORTANCE OF INFORMATION SYSTEMS PROBLEMS, BY INDUSTRY SECTOR

(Index Values)

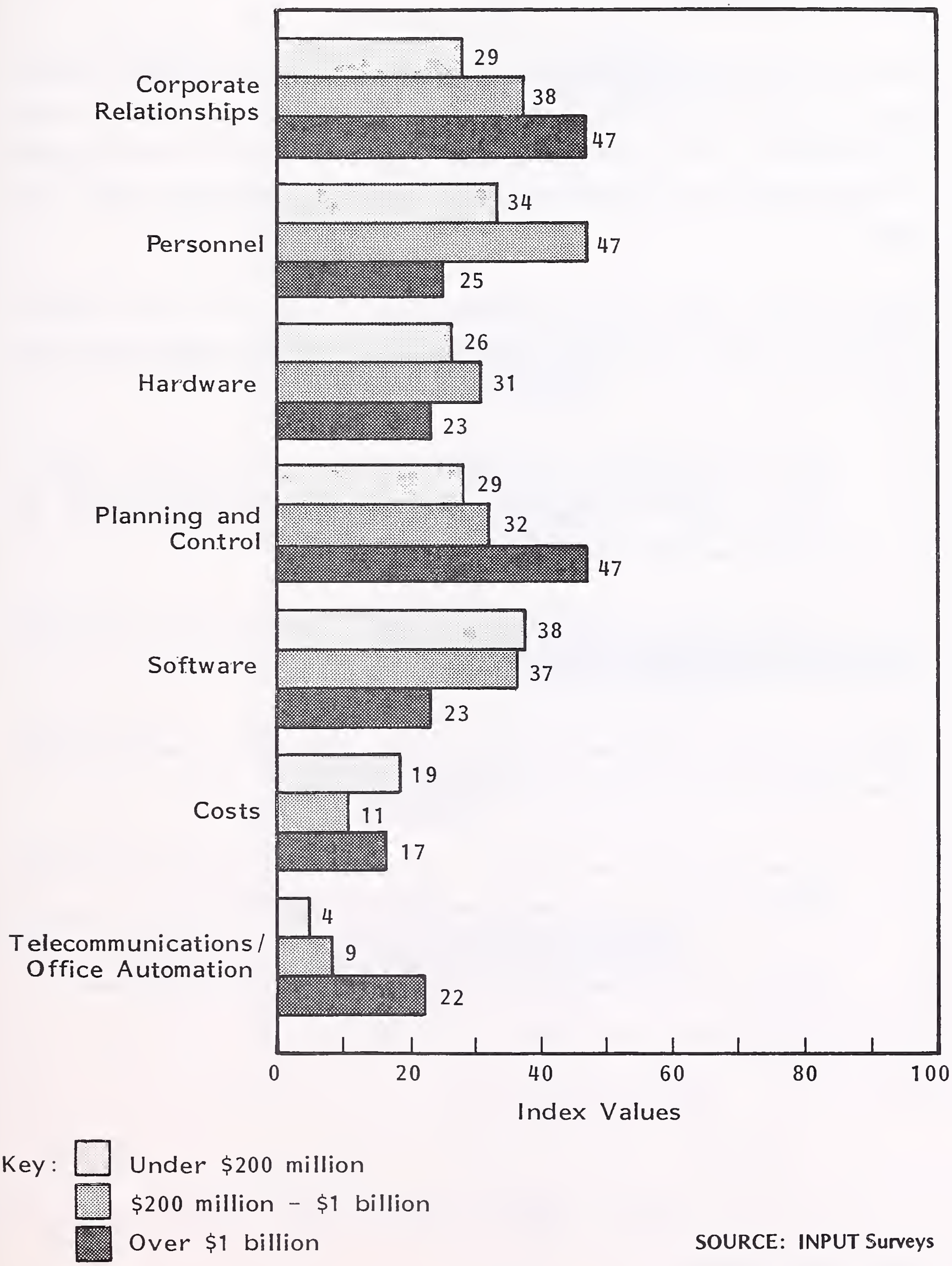
ISSUE GROUPS	DISCRETE MFG	PROCESS MFG	TRANSPORTATION	UTILITIES	BANKING/ FINANCE	INSURANCE	DISTRIBUTION	SERVICES	GOVERNMENT, EDUCATION
Corporate Relationships	58	51	43	44	37	29	22	32	13
Personnel	41	18	26	50	28	36	44	34	41
Hardware	35	30	26	31	51	44	37	22	47
Planning and Control	42	29	17	41	66	62	33	20	20
Software	44	27	26	18	40	35	26	30	45
Costs	16	18	9	19	7	13	10	10	36
Telecommunications, Office Automation	11	24	9	12	6	6	4	6	5

NOTE: The larger the index values, the greater the importance.

SOURCE: INPUT Surveys

EXHIBIT II-18

RELATIVE IMPORTANCE OF INFORMATION SYSTEMS PROBLEMS, BY COMPANY SIZE



SOURCE: INPUT Surveys

5. OBJECTIVES

- Objectives have a similar pattern to problems, with striking exceptions in the personnel, software, and telecommunications/office automation areas, as shown in Exhibit II-19.

- Personnel issues are important formal objectives in few companies. In part, this is due to the low priority given to human relations in many organizations. It also reflects the inability to come up with convincing ways to meet objectives (e.g., how can reduced turnover be achieved - easily or at all?).

- Software and telecommunications/office automation are in the opposite position of having objectives considered more important than related problems.

    - Software, of course, is an action area for most companies. Note in Exhibit II-20 how important software-related objectives are to the banking and utility sectors.

    - In telecommunications/office automation, companies are trying to get out in front of problems, before they become serious.

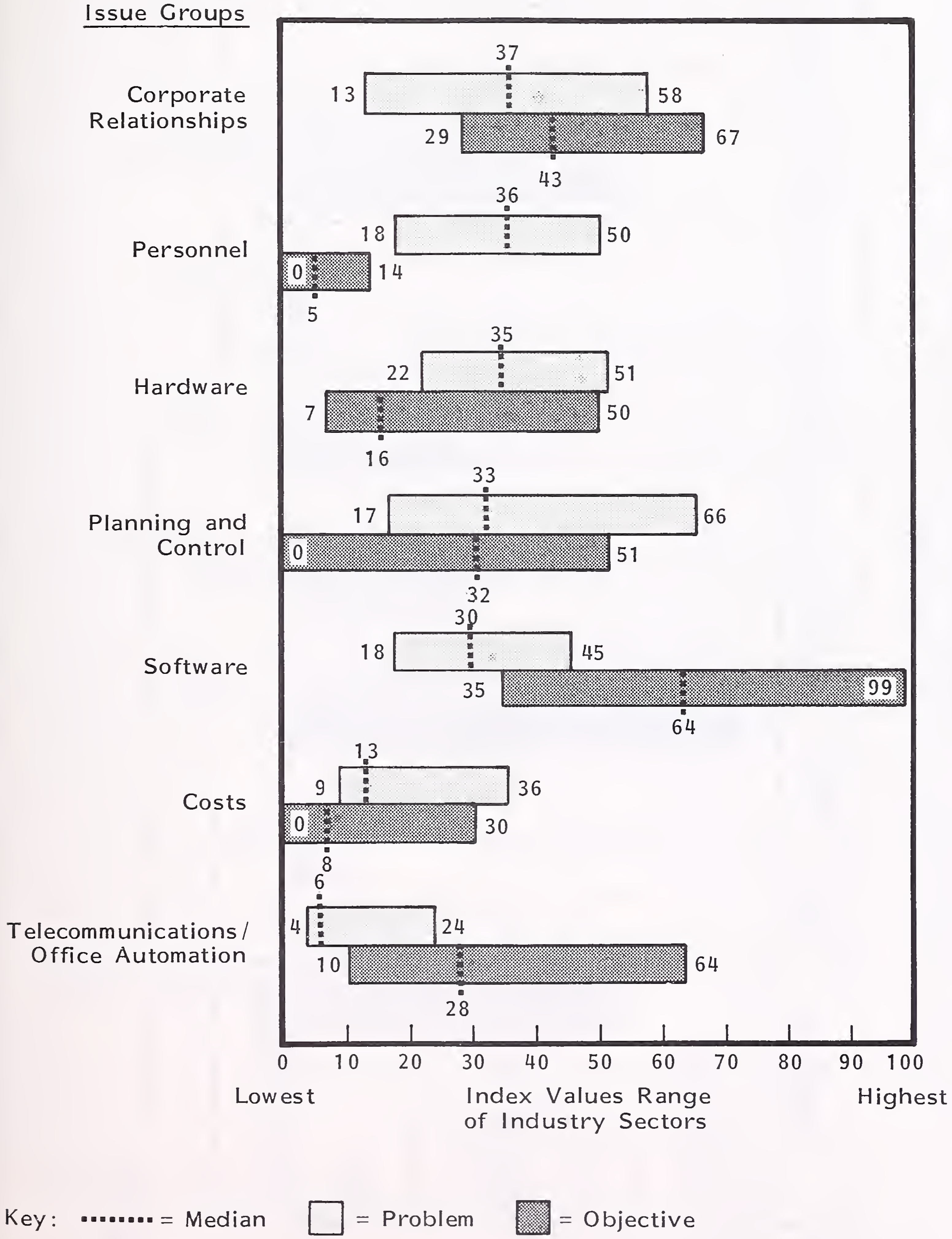
- There are several differences in the relative importance of company objectives linked to company size, as shown in Exhibit II-21.

    - Large companies place greater importance on corporate relationships, software, and telecommunications/office automation.

    - Medium-sized companies have fewer hardware-related objectives.

EXHIBIT II-19

RELATIVE IMPORTANCE OF INFORMATION SYSTEMS PROBLEMS VERSUS OBJECTIVES



SOURCE: INPUT Surveys

EXHIBIT II-20

RELATIVE IMPORTANCE OF INFORMATION SYSTEMS OBJECTIVES, BY INDUSTRY SECTOR

(Index Values)

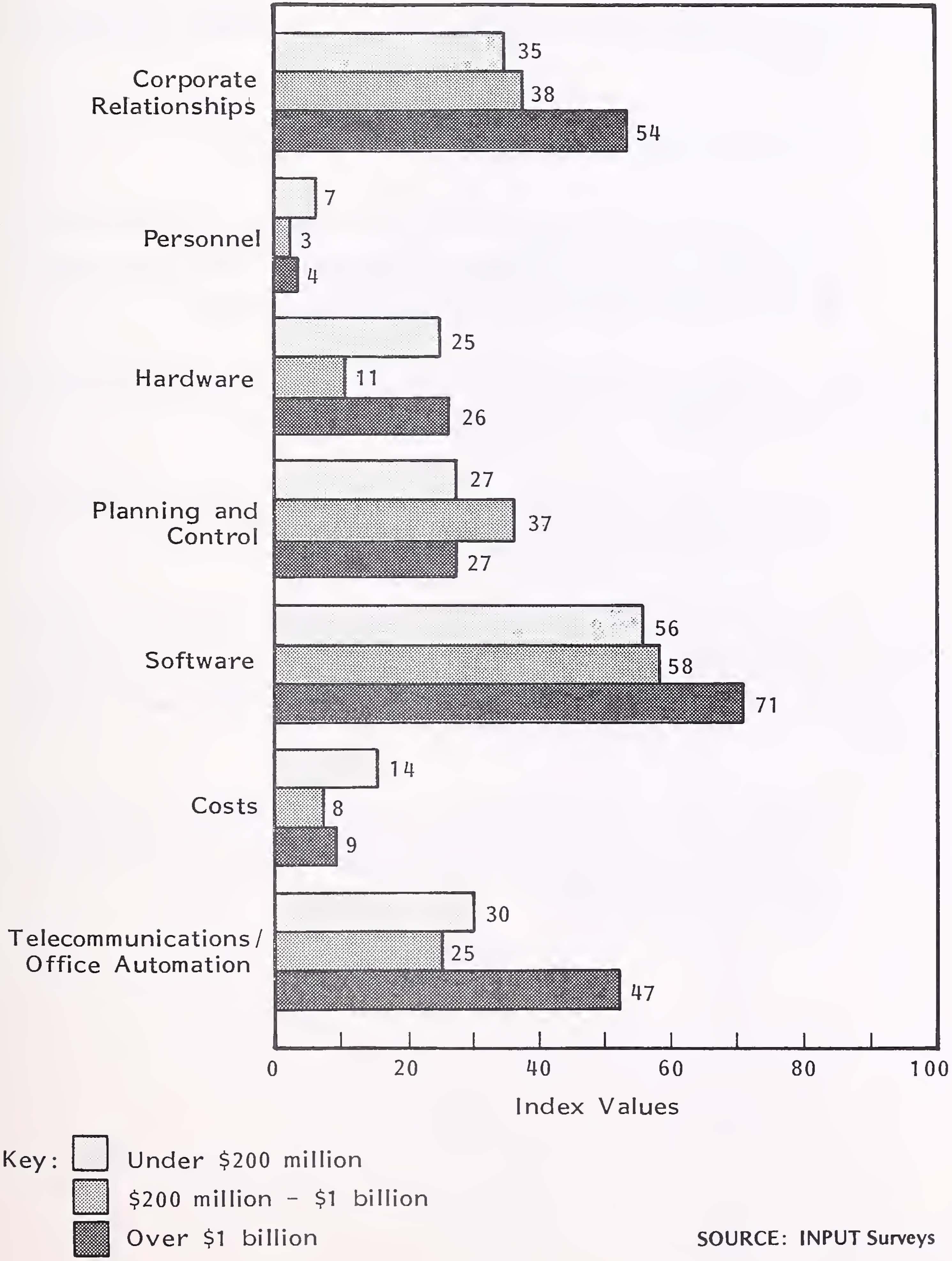
ISSUE GROUPS	DISCRETE MFG	PROCESS MFG	TRANSPORTATION	UTILITIES	BANKING/ FINANCE	INSURANCE	DISTRIBUTION	SERVICES	GOVERNMENT, EDUCATION
Corporate Relationships	43	57	67	50	25	64	37	34	29
Personnel	8	2	0	0	5	0	5	6	14
Hardware	25	11	33	50	35	16	11	14	7
Planning and Control	44	32	17	51	40	32	18	18	0
Software	68	66	100	64	100	63	56	52	35
Costs	8	14	0	9	30	21	0	6	0
Telecommunications, Office Automation	40	52	50	18	10	64	24	16	28

Note: The larger the index value, the greater the importance.

SOURCE: INPUT Surveys

EXHIBIT II-21

RELATIVE IMPORTANCE OF COMPANY OBJECTIVES, BY COMPANY SIZE



SOURCE: INPUT Surveys

6. INITIATIVES

- Planned initiatives are on the average in line with problems, objectives, or both, as shown in Exhibit II-22.

    - Personnel and hardware initiatives are on a level with the perceived problems.

    - Software initiatives are commensurate with objectives.

    - It is interesting that the actual initiatives planned for telecommunications/office automation do not come close to the stated importance. Obviously, most efforts are still in the preplanning phase.

- Company size serves as a discriminant for only a few initiative groups, as shown in Exhibit II-23.

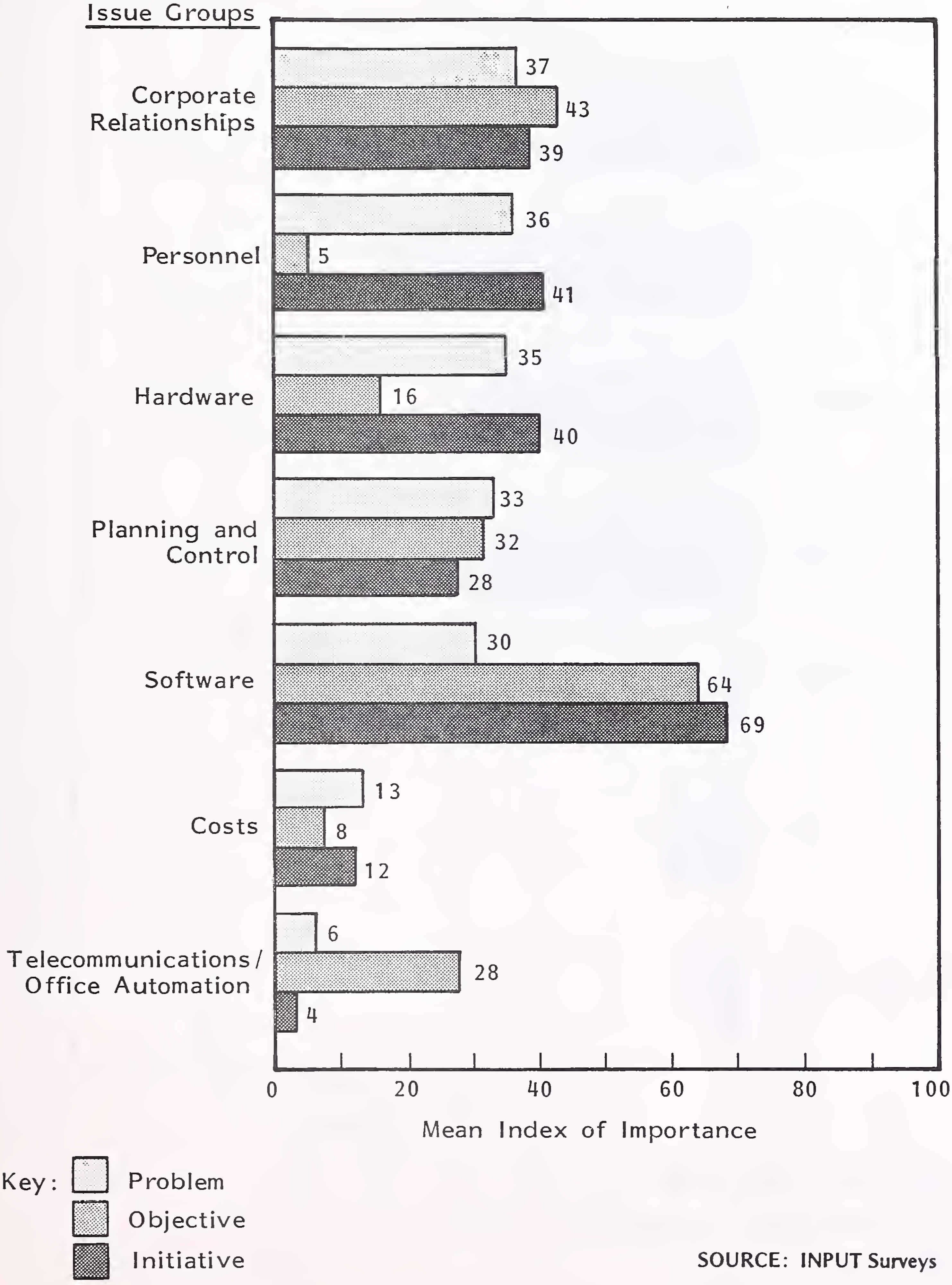
    - Both corporate relationships and planning and control increase in importance as company size increases.

- Note the very high importance given to software, shown previously in Exhibit II-20. An examination of individual industry sectors in Exhibit II-24 shows how important software-related initiatives will be in the banking and insurance areas.

    - Whether such a disproportionate emphasis is desirable in this group compared to the corporate relationships, personnel, and planning and control areas is debatable.

EXHIBIT II-22

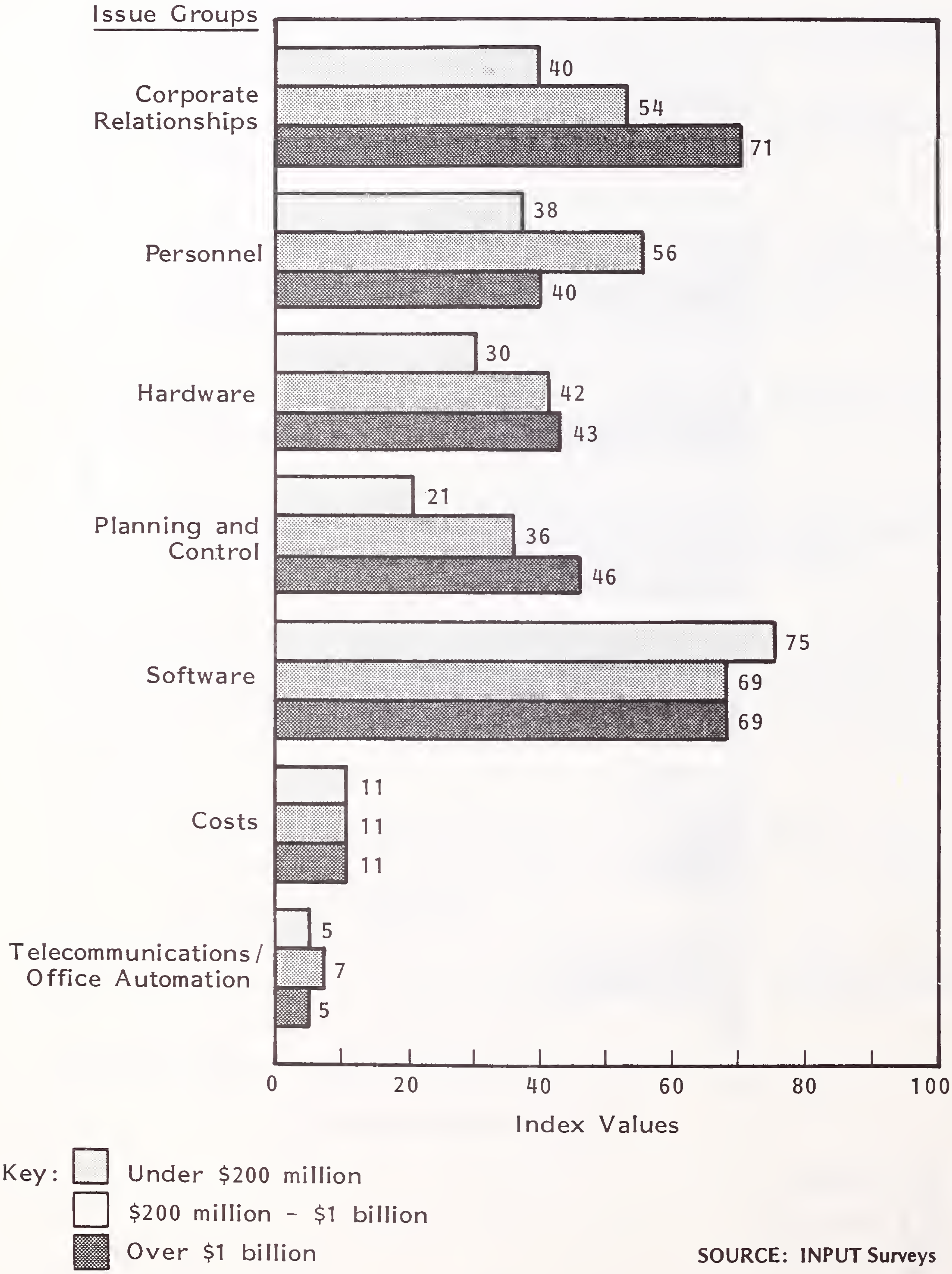
RELATIVE IMPORTANCE OF INFORMATION SYSTEMS PROBLEMS, OBJECTIVES, AND INITIATIVES



SOURCE: INPUT Surveys

EXHIBIT II-23

RELATIVE IMPORTANCE OF INFORMATION SYSTEMS INITIATIVES, BY COMPANY SIZE



SOURCE: INPUT Surveys

EXHIBIT II-24

RELATIVE IMPORTANCE OF INFORMATION SYSTEMS INITIATIVES, BY INDUSTRY SECTOR

(Index Values)

ISSUE GROUPS	DISCRETE MFG	PROCESS MFG	TRANSPORTATION	UTILITIES	BANKING/ FINANCE	INSURANCE	DISTRIBUTION	SERVICES	GOVERNMENT, EDUCATION
Corporate Relationships	67	75	39	72	66	38	38	36	25
Personnel	64	41	15	43	45	29	45	36	36
Hardware	27	44	48	25	55	40	33	40	33
Planning and Control	39	35	5	91	28	45	26	14	23
Software	84	66	73	69	113	135	54	44	56
Costs	13	13	0	13	10	7	12	4	21
Telecommunications, Office Automation	5	7	5	0	3	0	4	4	18

NOTE: The larger the index values, the greater the importance.

SOURCE: INPUT Surveys

E. PERSONAL COMPUTERS

- INPUT's recent report, Personal Computers in the Information System Strategy, December 1982, describes the personal computer explosion now occurring in the corporate environment.

- Chapter III provides information on an industry-by-industry basis. This was not provided in the earlier study, which focused on overall trends and issues.

- As an aid to readers of this report, this section will summarize key personal computer data on a cross-industry basis. The underlying data appeared in the earlier report.

- A key fact about personal computers is that they have had a rapid takeoff: over three-quarters have been in place less than one year, as shown in Exhibit II-25.

- The most important personal computer issue facing IS departments is the amount of user independence that they represent.

    - IS funds are rarely used, as shown in Exhibit II-26.

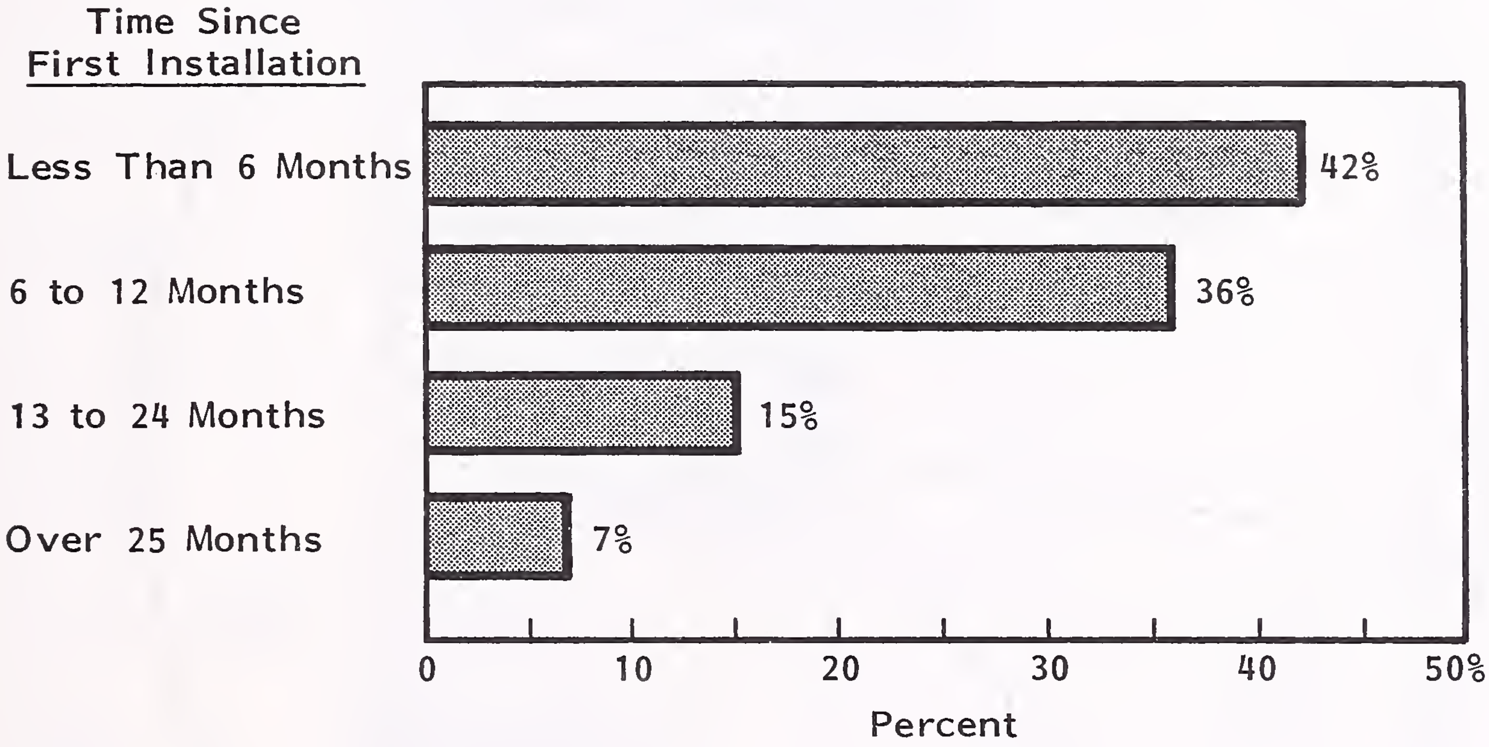
    - The IS department is only looked to for assistance about one time in five, as shown in Exhibit II-27.

- Personal computers are used in a very wide area of applications, as shown in Exhibit II-28.

    - Even though "Calc" packages are the most widely used, many other packages are already being used, as shown in Exhibit II-29.

EXHIBIT II-25

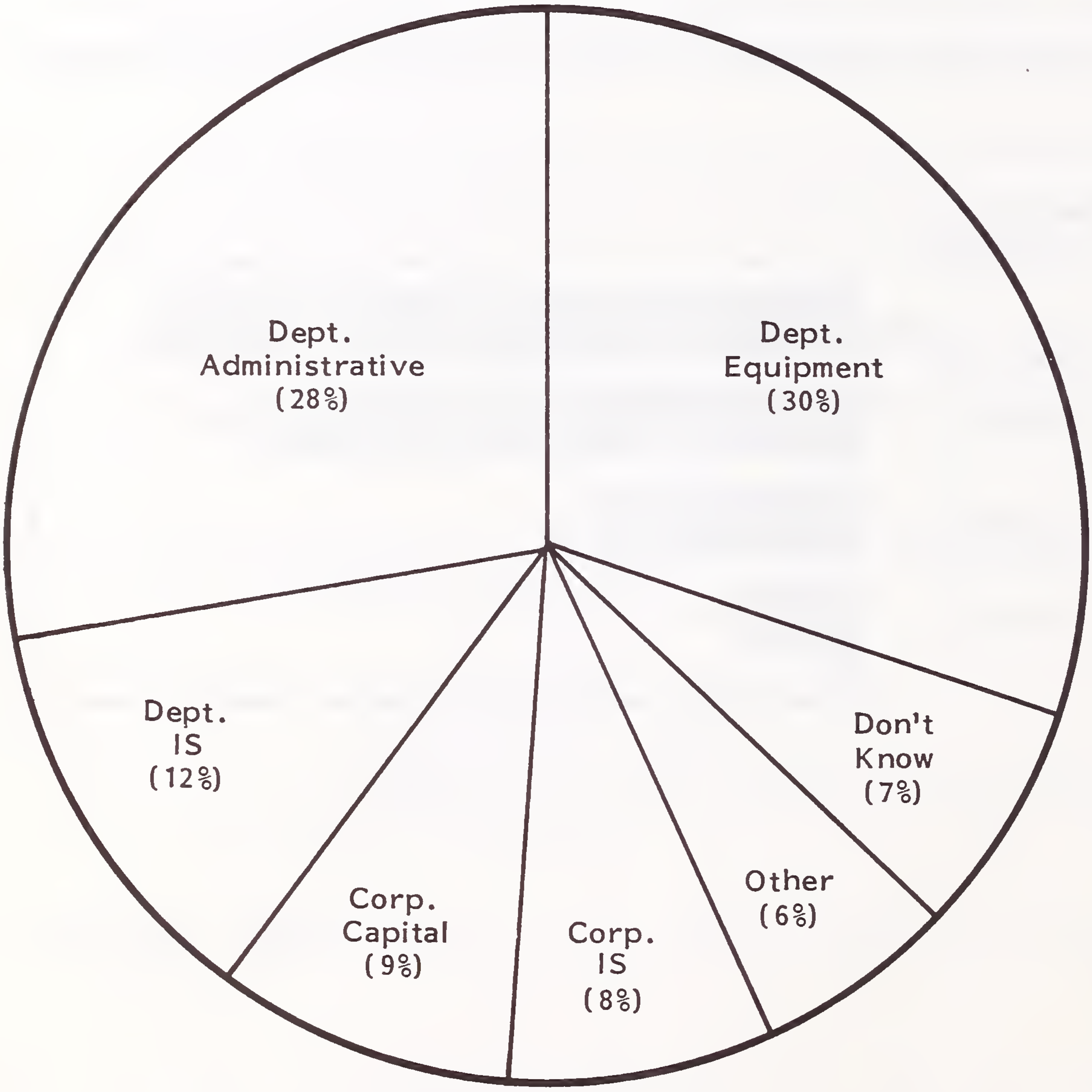
TIME SINCE FIRST PERSONAL COMPUTER INSTALLED IN DEPARTMENT



SOURCE: INPUT Surveys

EXHIBIT II-26

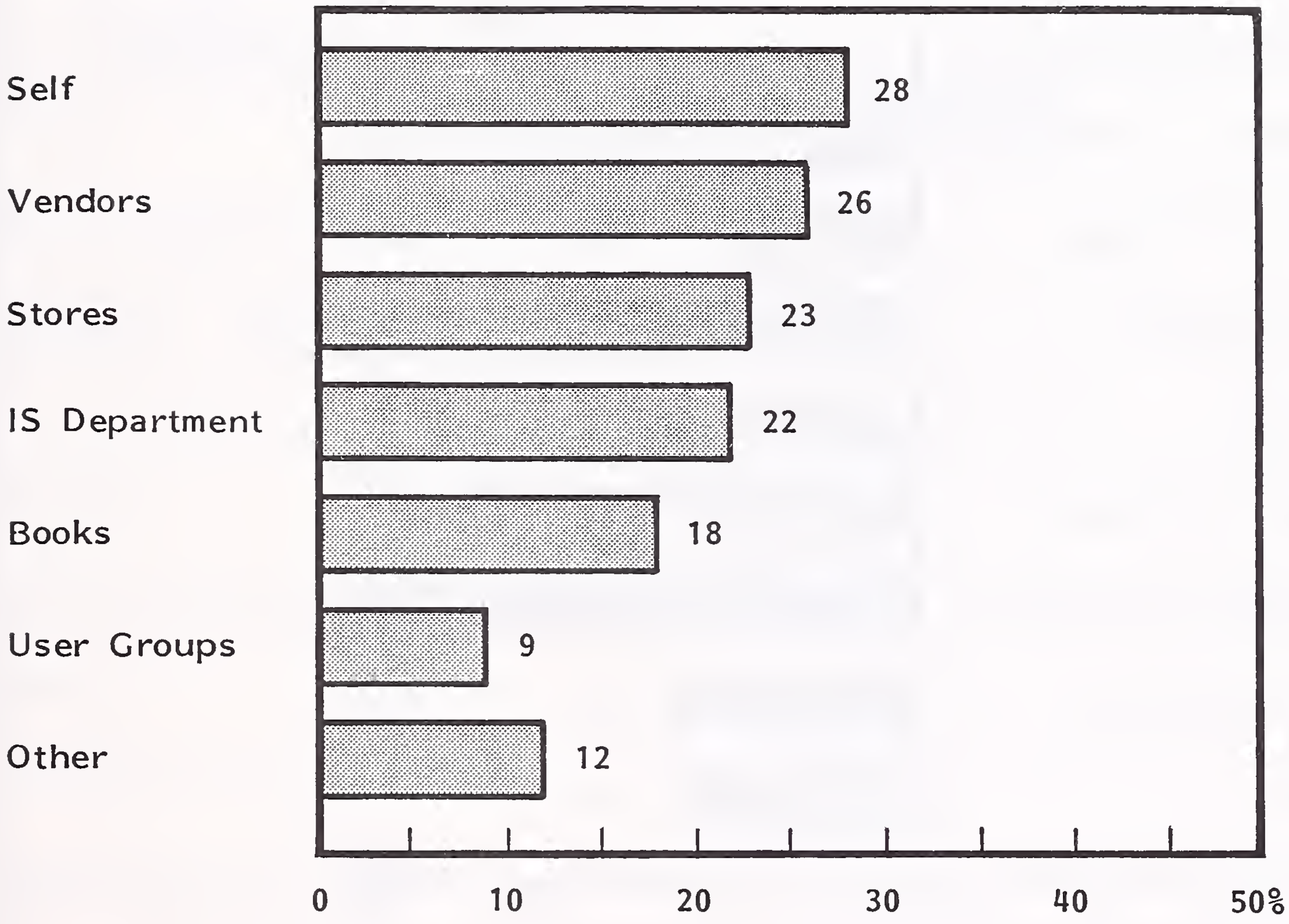
BUDGET SOURCES FOR PERSONAL COMPUTER FUNDS



SOURCE: INPUT Surveys

EXHIBIT II-27

SOURCES OF ASSISTANCE FOR PERSONAL COMPUTER USERS

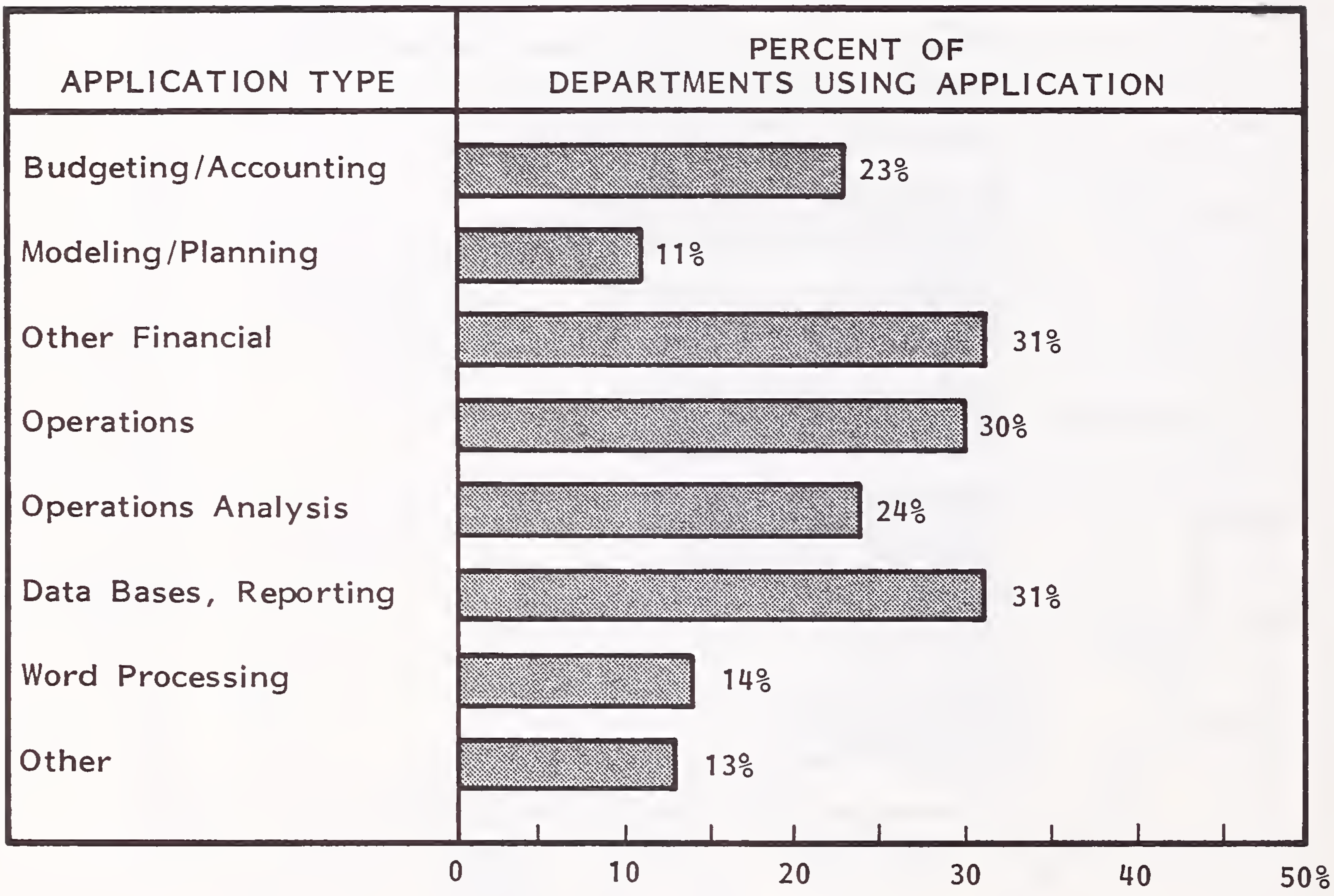


Note: Total is more than 100% because of multiple sources.

SOURCE: INPUT Surveys

EXHIBIT II-28

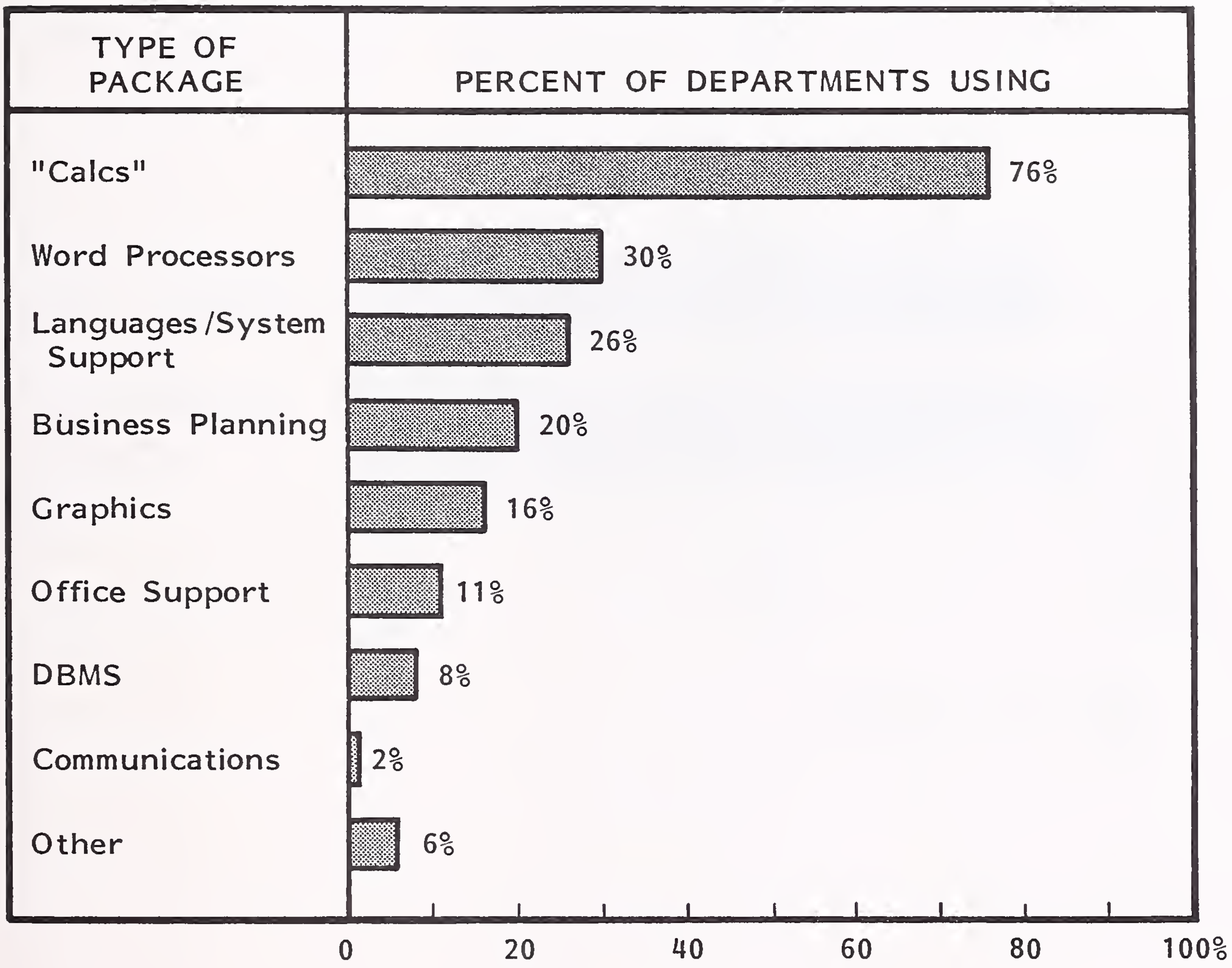
PERSONAL COMPUTER APPLICATIONS



SOURCE: INPUT Surveys

EXHIBIT II-29

TYPES OF PERSONAL COMPUTER SOFTWARE PACKAGES USED



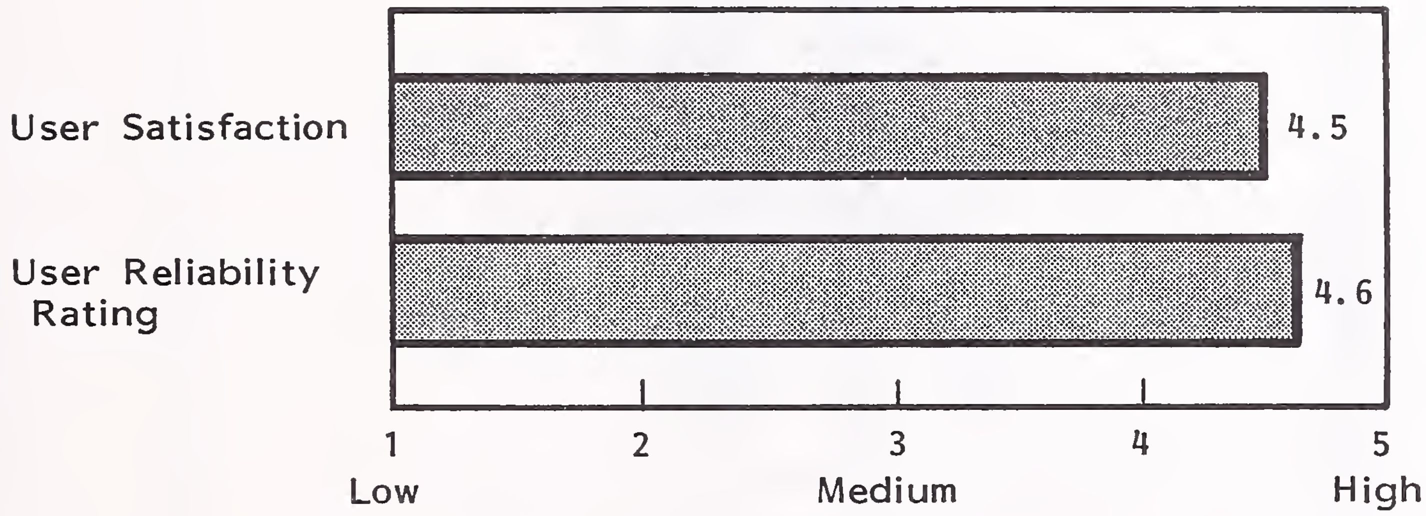
SOURCE: INPUT Survey

SOURCE: INPUT Surveys

- Personal computer users are very pleased with their systems and with their reliability, as shown in Exhibit II-30.
    - Current users are already planning to obtain more software and hardware, as shown in Exhibits II-31 and 32.

EXHIBIT II-30

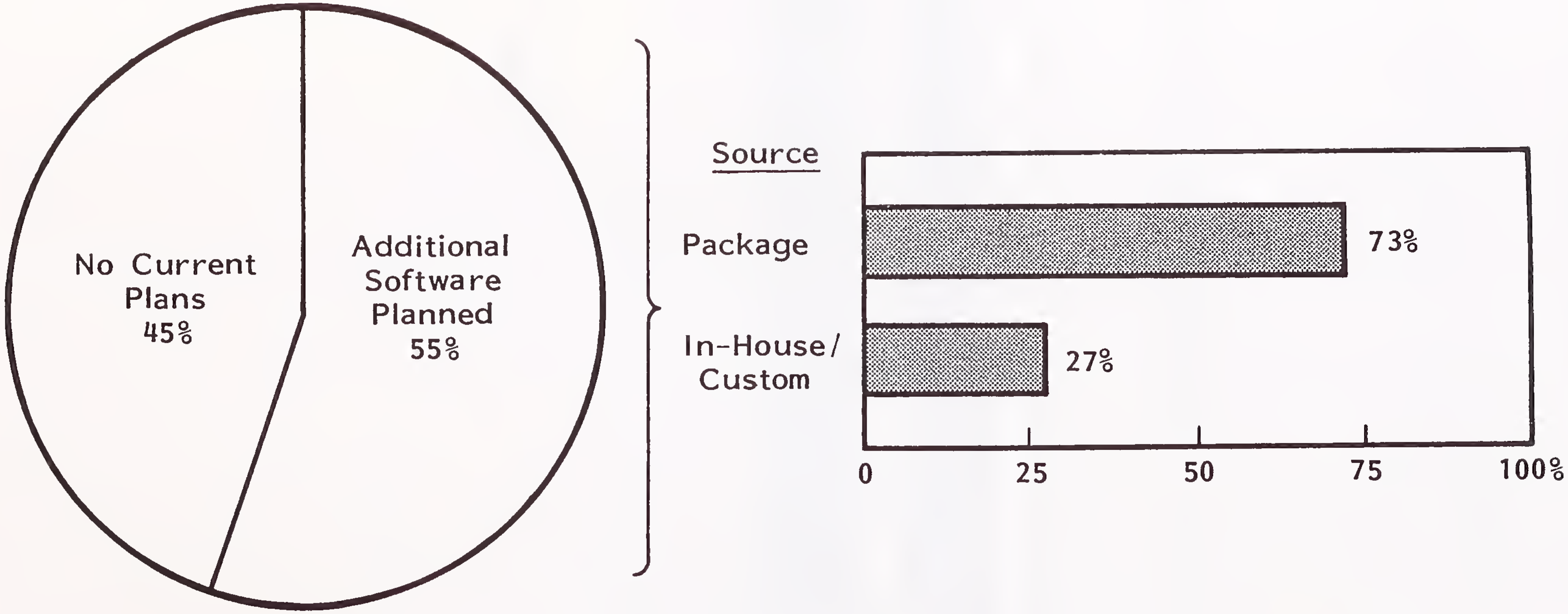
USER SATISFACTION AND PERSONAL COMPUTER RELIABILITY



SOURCE: INPUT Surveys

EXHIBIT II-31

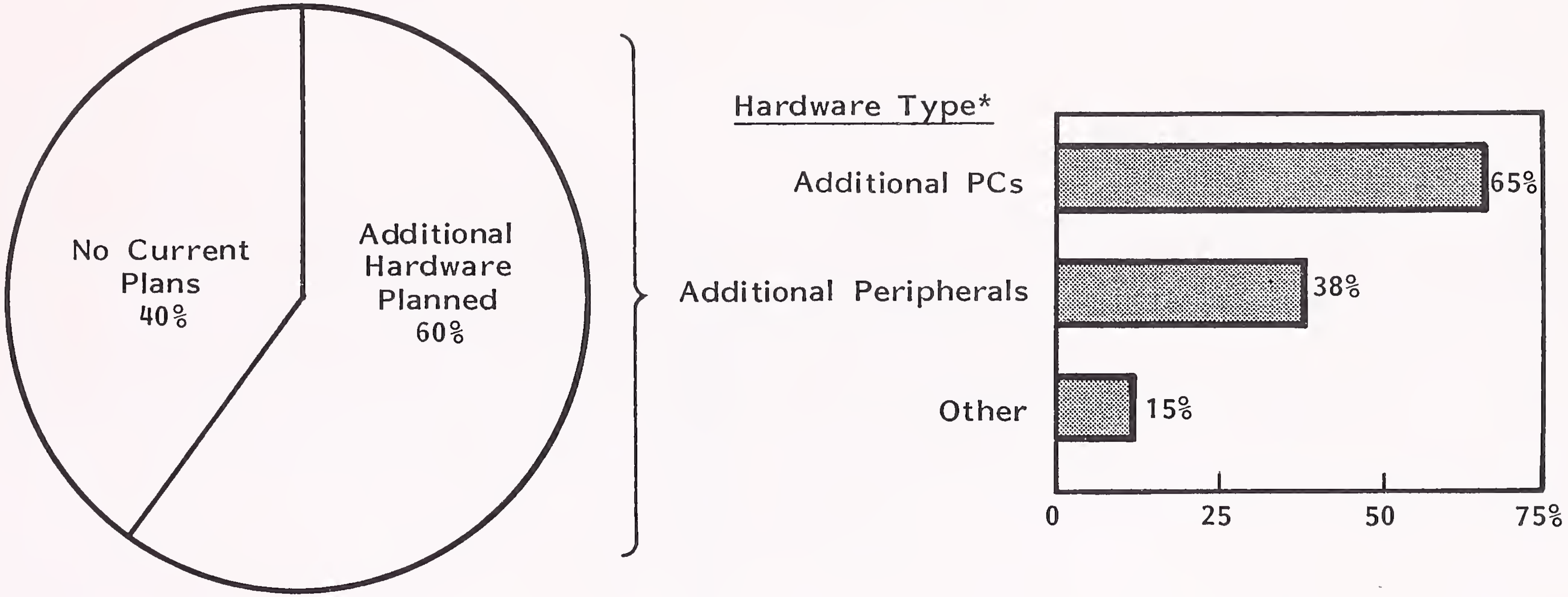
USER PLANS FOR ADDITIONAL PERSONAL COMPUTER SOFTWARE



SOURCE: INPUT Surveys

EXHIBIT II-32

USER PLANS FOR ADDITIONAL PERSONAL COMPUTER HARDWARE



* Totals more than 100% because of multiple plans

SOURCE: INPUT Survey

SOURCE: INPUT Surveys

III INDUSTRY SECTOR ANALYSIS

III INDUSTRY SECTOR ANALYSIS

A. INTRODUCTION

- The previous chapter looked at overall industry trends as well as comparing particular industry sectors in the aggregate.

- This chapter takes each individual industry sector and examines it in the same areas as Chapter II, but in more detail.

- For ease of reference, when referring to companies of different sizes, the following terminology is used:

    - "Small" applies to companies (and independent divisions) with revenue (or, in the case of banks, assets) under $200 million.

    - "Medium" applies to the size range between $200 million and $1 billion.

    - "Large" applies to those over $1 billion.

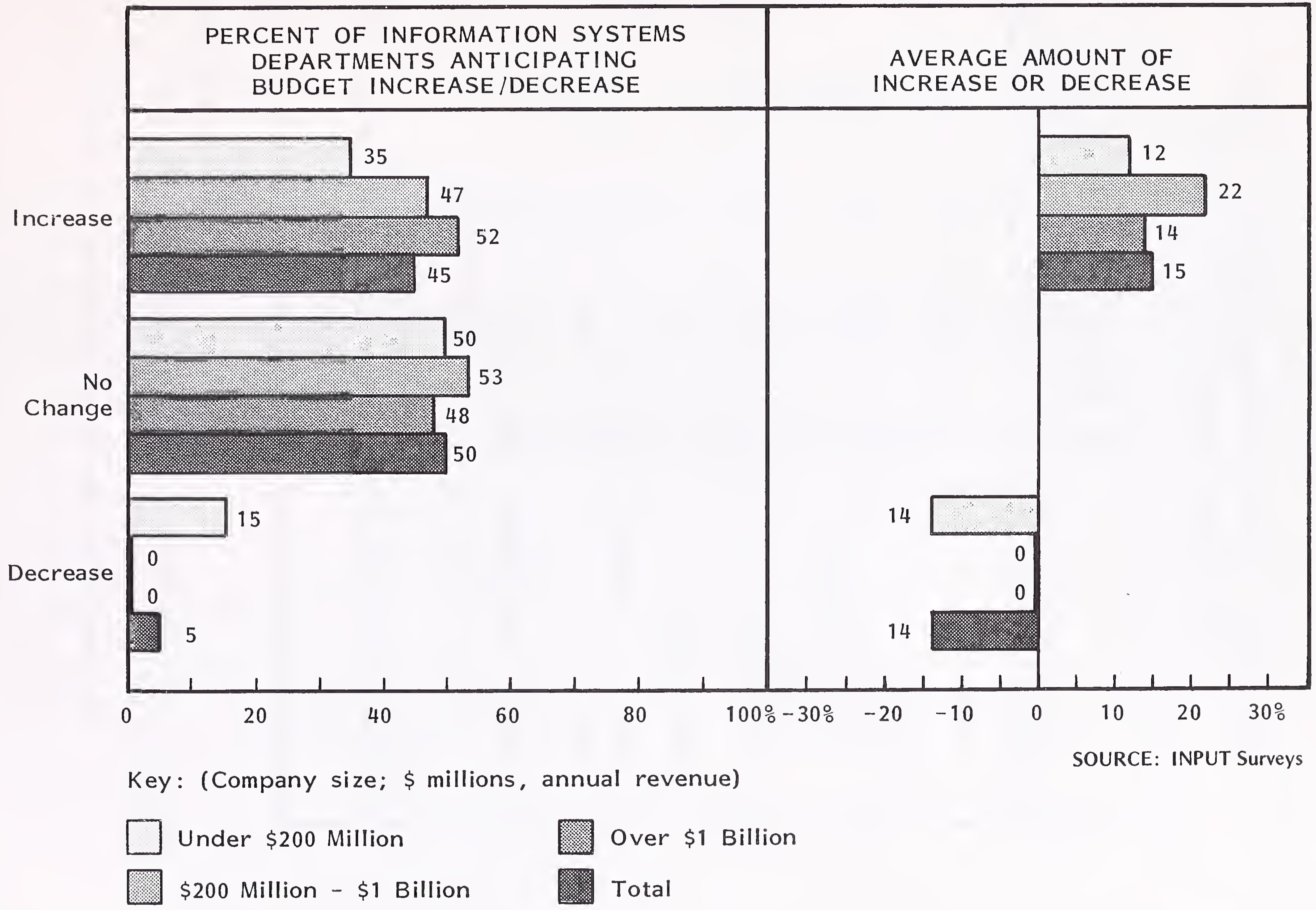
B. DISCRETE MANUFACTURING SECTOR

1. BUDGETS

- In this sector 45% of the companies expect budget increases in 1983, compared to 61% generally. However, only 5% expect a decrease compared to 8% generally, as shown in Exhibit III-1.
    - Companies expecting to increase their budgets foresee an average rise of 15%.
    - Companies anticipating decreases expect their budgets to drop by 14%.
- The budget increases expected vary by company size.
    - Large companies: 52% expect increases in the discrete manufacturing sector, compared to 63% for large companies generally.
    - Medium companies: 47% expect increases, compared to 63% for medium companies generally.
    - Small companies: 35% expect increases, compared to 57% for small companies generally.
- The average budget growth expected for 1983 in discrete manufacturing is 7%, compared to 17% in 1982.
    - This represents a decline of 60%.
- The 1982 IS budget distribution is shown in Exhibit III-2.

EXHIBIT III-1

ANTICIPATED BUDGET INCREASES FOR 1983 IN DISCRETE MANUFACTURING



SOURCE: INPUT Surveys

EXHIBIT III-2

1982 BUDGET DISTRIBUTION AND 1982/1983 CHANGES IN THE DISCRETE MANUFACTURING SECTOR

BUDGET CATEGORY	PERCENT OF I.S. BUDGET (1982)	EXPECTED CHANGE 1982 to 1983
Personnel	48%	5%
Hardware		
Mainframe	17	4
Mini/Microcomputer	1	33
Terminals	3	11
Peripherals	4	12
Communications	10	12
Software and Services		
Software	2	19
Processing Services	1	-13
Software Maintenance	1	8
Hardware Maintenance	3	3
Other	10	5
Total	100%	7%

SOURCE: INPUT Surveys

- Only mini/microcomputers and software expenditures are expected to increase significantly in 1983.

- Personnel budget growth is expected to be at or below the general inflation rate.

- The average budget growth expected for 1983 is 6.7%, compared to 16.9% in 1982.

  - This represents a decline of 60%.

  - This is the largest decline in the budget growth rate for any industry sector.

- Exhibit III-3 shows the range of the ratios in the discrete manufacturing sector between the IS budget and the company's total revenues.

  - The IS percentage of total revenues for the average company (i.e., at the 50th percentile) in each size group was:

    - For large companies: 0.8%, compared to 0.55% for this size company generally.

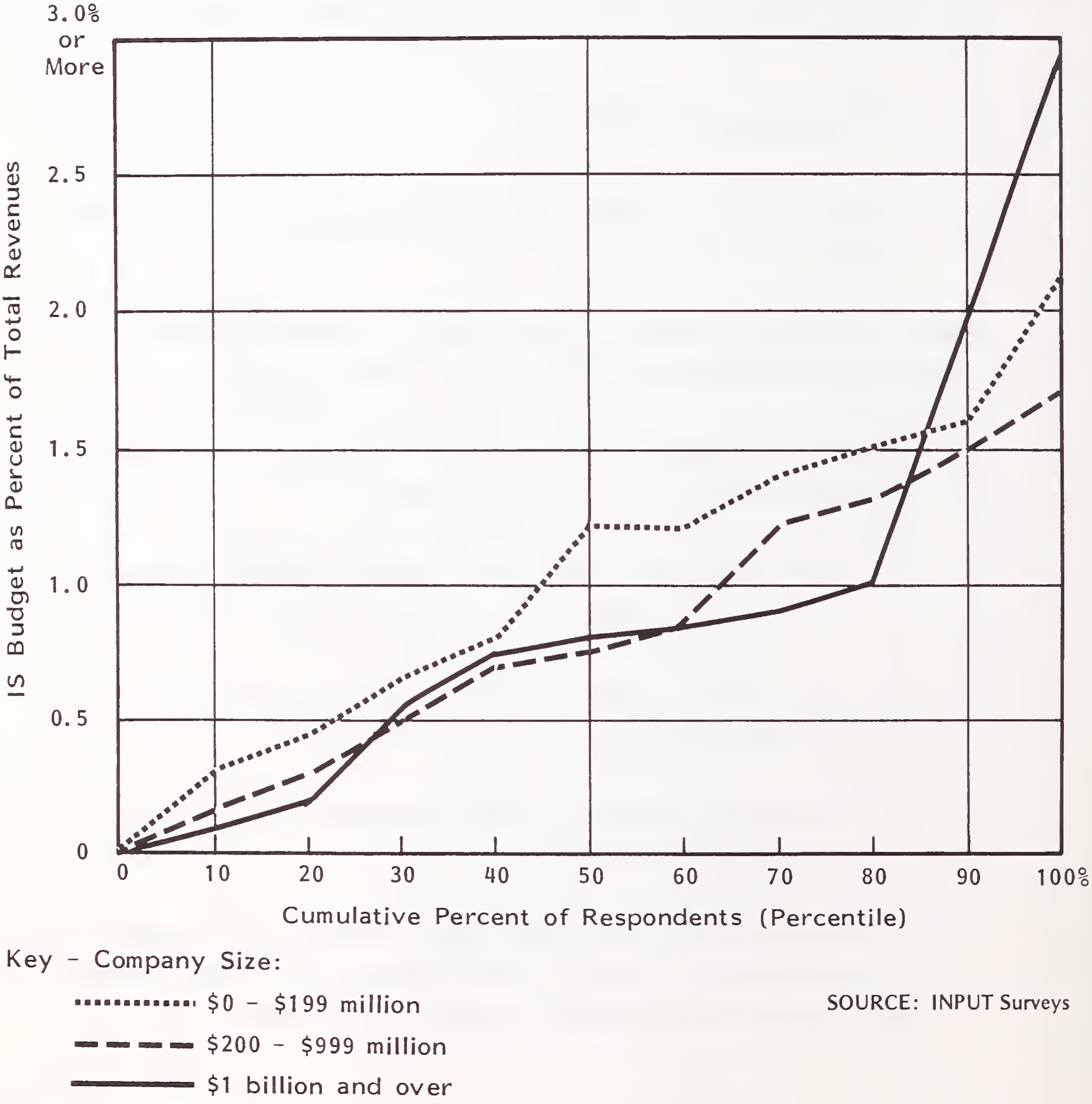
    - For medium companies: 0.7%, compared to 0.8% for this size company generally.

    - For small companies: 1.2%, compared to 1.2% for this size company generally.

  - The companies that spend least on data processing as a percentage of revenues are those at and below the 20th percentile. Taking the 10th percentile as representative IS spending, percentages were:

EXHIBIT III-3

INFORMATION SYSTEMS BUDGET AS A PERCENT OF TOTAL REVENUES IN THE DISCRETE MANUFACTURING SECTOR



SOURCE: INPUT Surveys

    - Large companies: 0.1%.

    - Medium companies: 0.15%.

    - Small companies: 0.3%.

  - The companies that spend the most on data processing as a percentage of revenues are those at and above the 80th percentile. Taking the 90th percentile as representative IS spending percentages were:

    - Large companies: 2.1%.

    - Medium companies: 1.5%.

    - Small companies: 1.6%.

  - Many of the large manufacturing companies are now committed to ambitious and expensive CAD/CAM undertakings.

- Median spending on IS per corporate employee was $780. However, there was a broad range of spending ratios, as shown in the diagram in Exhibit III-4.

  - The reasons for this variation were discussed in Chapter II, Section B.

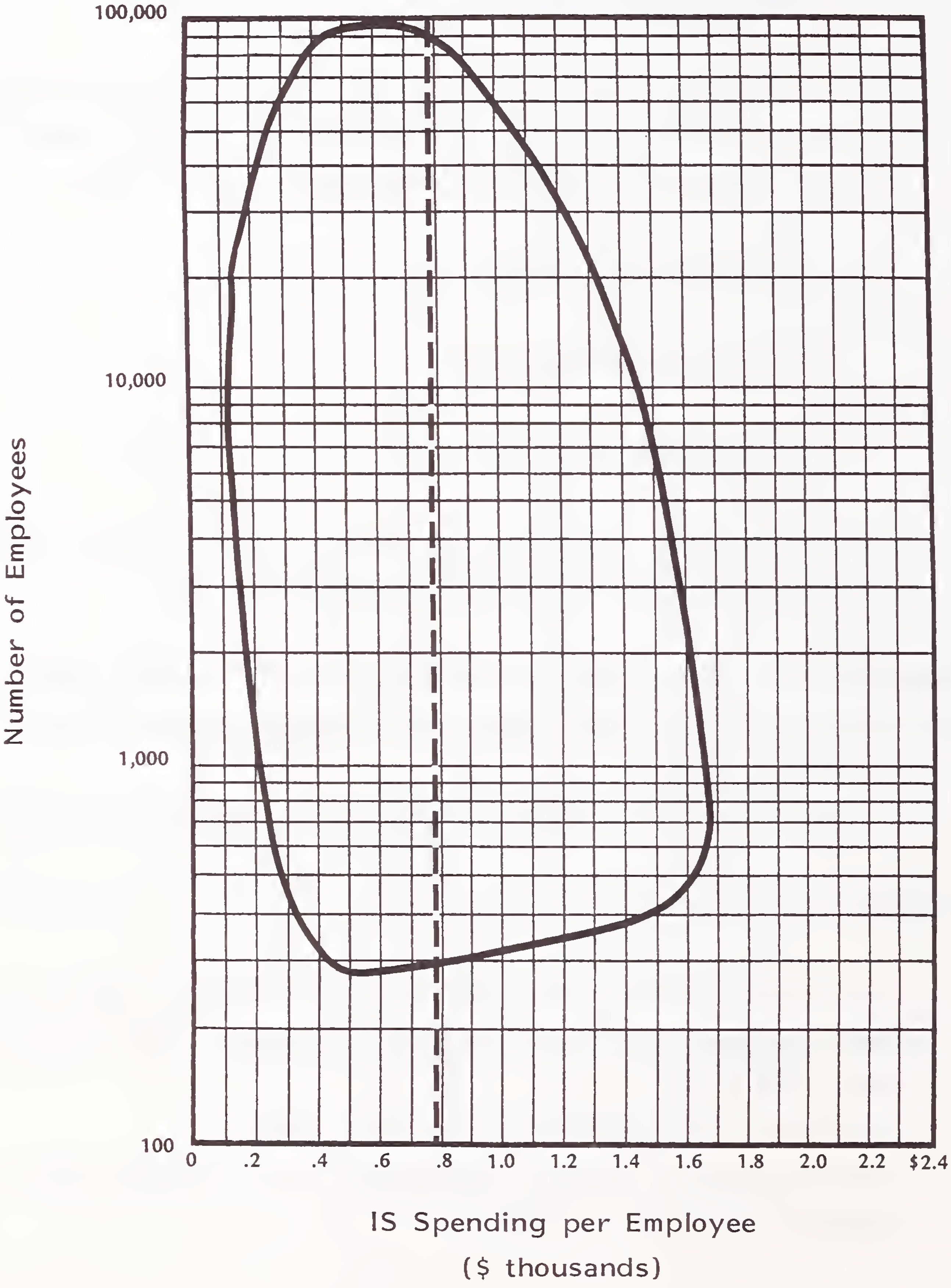
2. STAFFING

- In the discrete manufacturing sector, 49% of companies expect their IS staffs to increase in the next 12 months, compared to the industry average of 58%, as shown in Exhibit III-5.

  - The net increase in number of staff is expected to be 0.9%, compared to the all-industry average of 4%.

EXHIBIT III-4

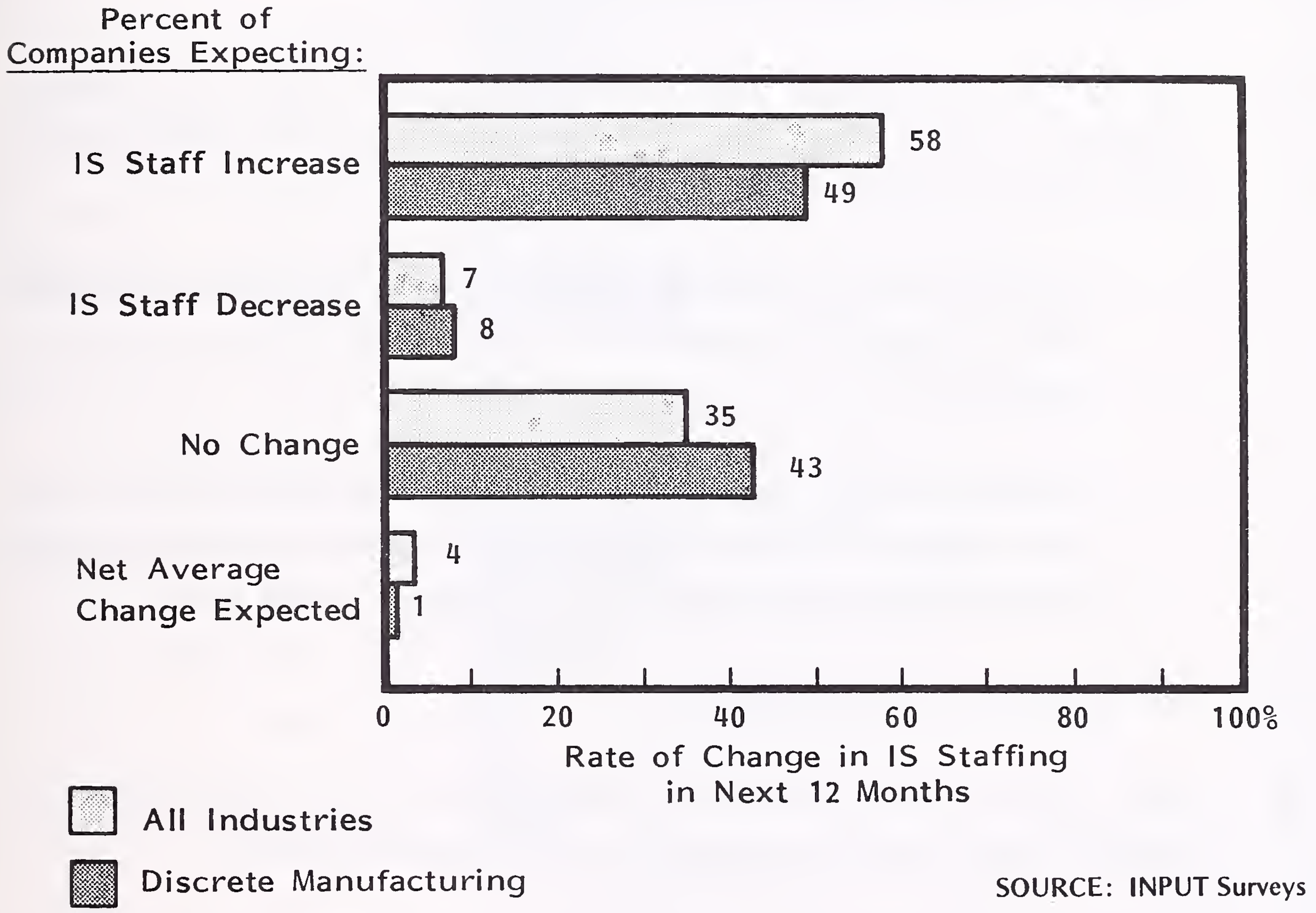
INFORMATION SYSTEMS SPENDING PER EMPLOYEE BY COMPANY SIZE IN THE DISCRETE MANUFACTURING SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-5

INFORMATION SYSTEMS CHANGES EXPECTED IN THE NEXT TWELVE MONTHS IN THE DISCRETE MANUFACTURING SECTOR



SOURCE: INPUT Surveys

- Turnover in this sector is expected to be about 60% of the all-industry average.

  - Turnover rates for individual positions are shown in Exhibit III-6. For technical positions, turnover is quite similar to the all-industry profile.

- Difficulty in recruiting staff in this sector is broadly similar to the all-industry average, as shown in Exhibit III-7. Data base specialists are even more difficult to recruit than elsewhere (see Exhibit II-10).

- The number of programs to be maintained averages 1,200 in this sector, although the range, both in absolute numbers and based on a company size, is quite broad, as shown in Exhibit III-8.

  - Maintenance, as a proportion of total workload, is higher in this sector than it is generally, although it is expected to decline, as shown in Exhibit III-9.

  - Company size does have some effect on the maintenance factor, with more medium companies planning new development work and smaller companies doing more maintenance, as shown in Exhibit III-10.

3. INFORMATION SYSTEMS ISSUES

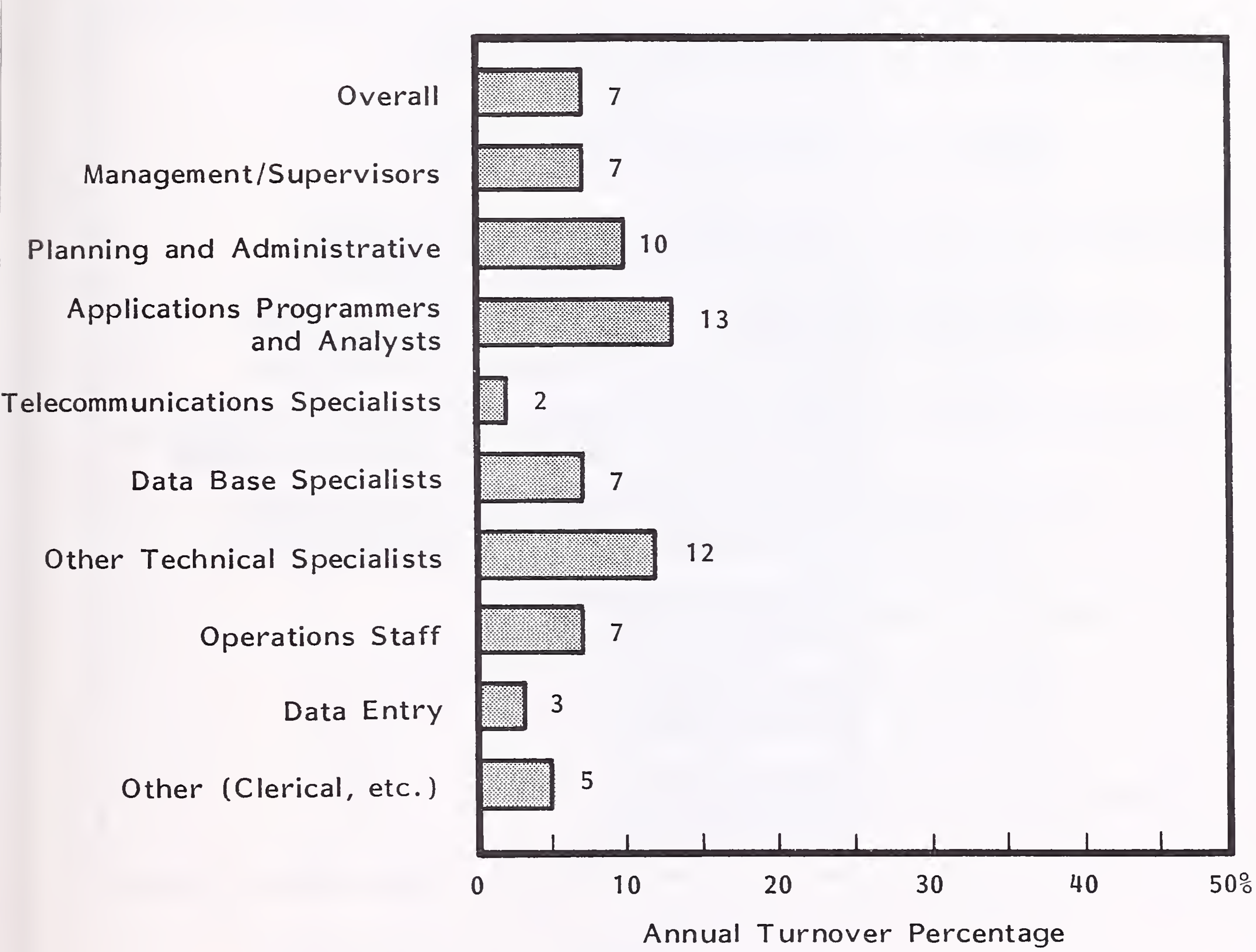
- Note: please refer to Chapter II, Section D for a general discussion of IS problems, objectives, and initiatives and their interrelationships.

- The discrete manufacturing sector sees itself with many more problems in corporate relationships and software than companies in general do, as shown in Exhibit III-11.

  - More detailed information about specific problem areas is contained in Exhibit III-12. This exhibit shows the percentage of companies in this sector which regard an issue as a major problem.

EXHIBIT III-6

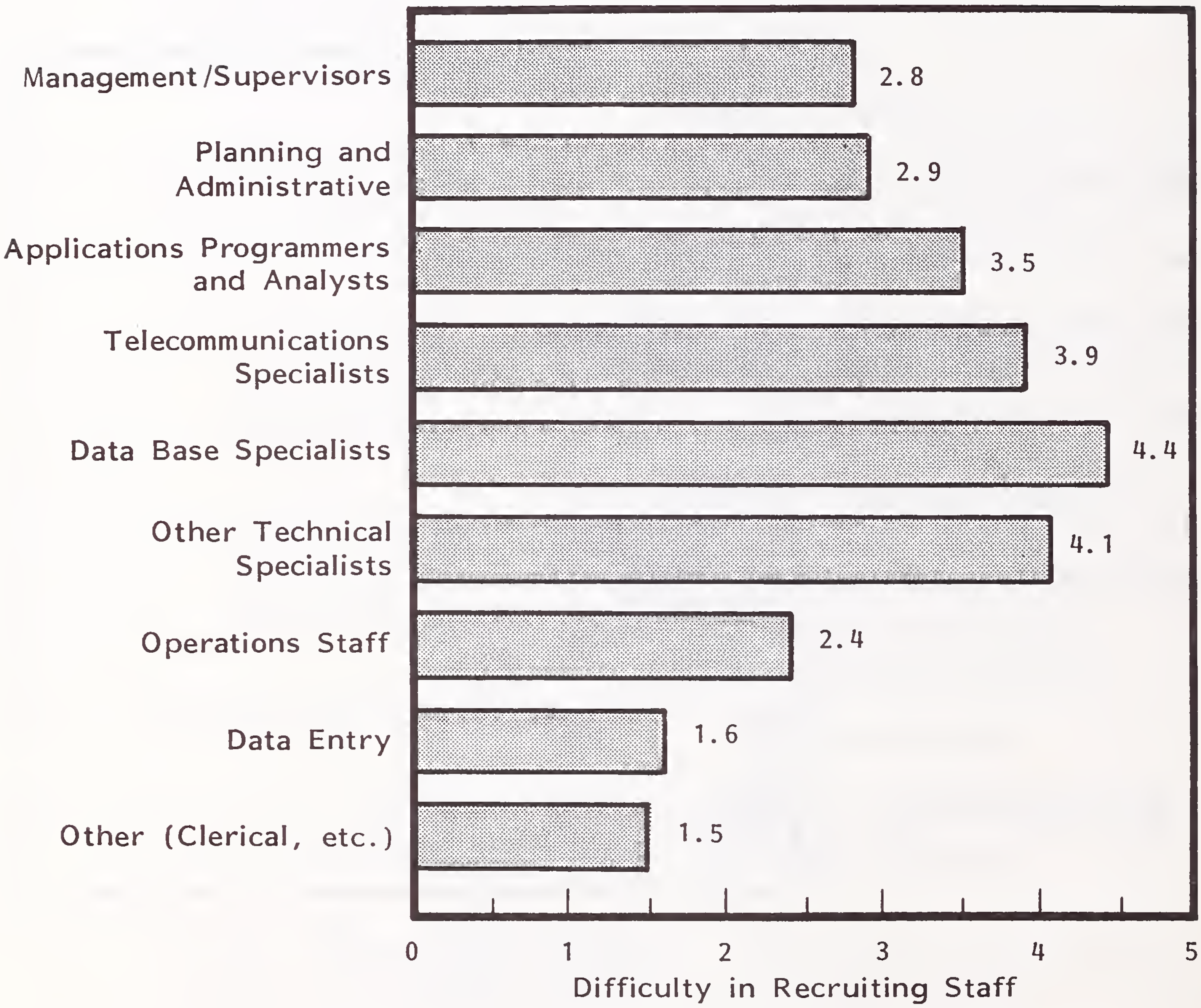
CURRENT ANNUAL TURNOVER IN THE DISCRETE MANUFACTURING SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-7

DIFFICULTY IN RECRUITING STAFF IN THE DISCRETE MANUFACTURING SECTOR

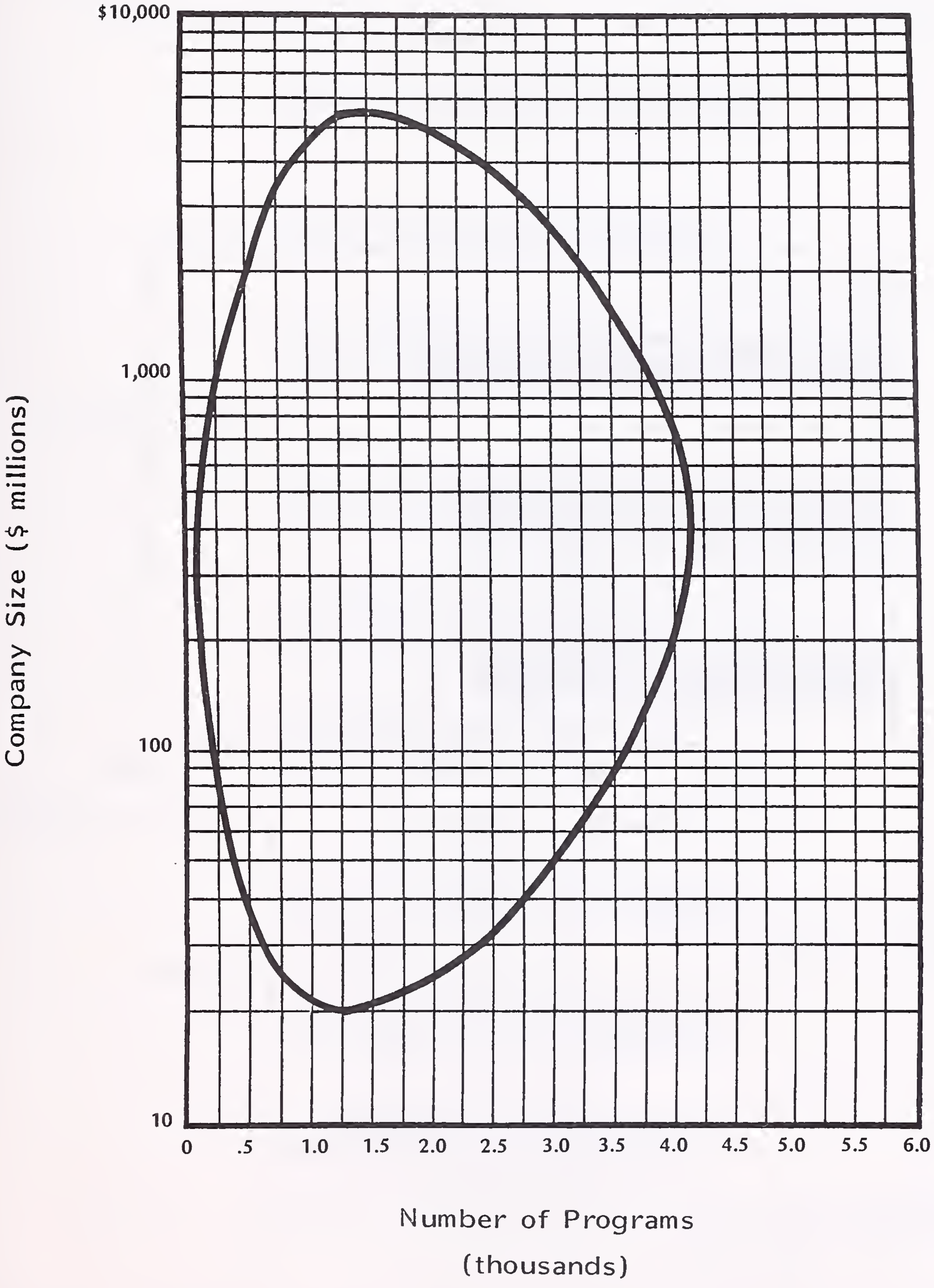


Scale: 1 = Low, 5 = High

SOURCE: INPUT Surveys

EXHIBIT III-8

NUMBER OF PROGRAMS BY COMPANY SIZE IN THE DISTRETE MANUFACTURING SECTOR

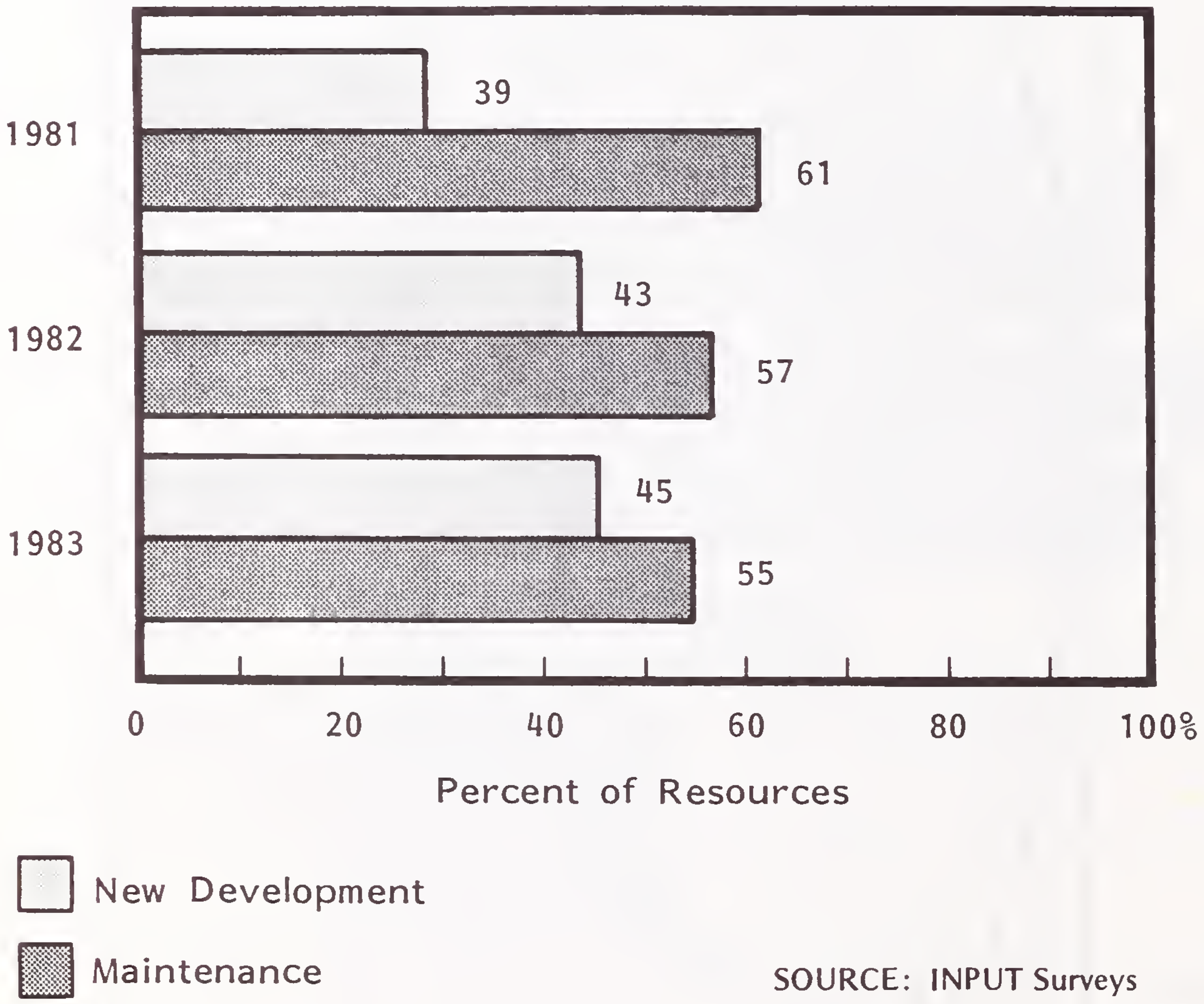


SOURCE: INPUT Surveys

EXHIBIT III-9

NEW PROGRAM DEVELOPMENT VERSUS MAINTENANCE IN THE DISCRETE MANUFACTURING SECTOR,

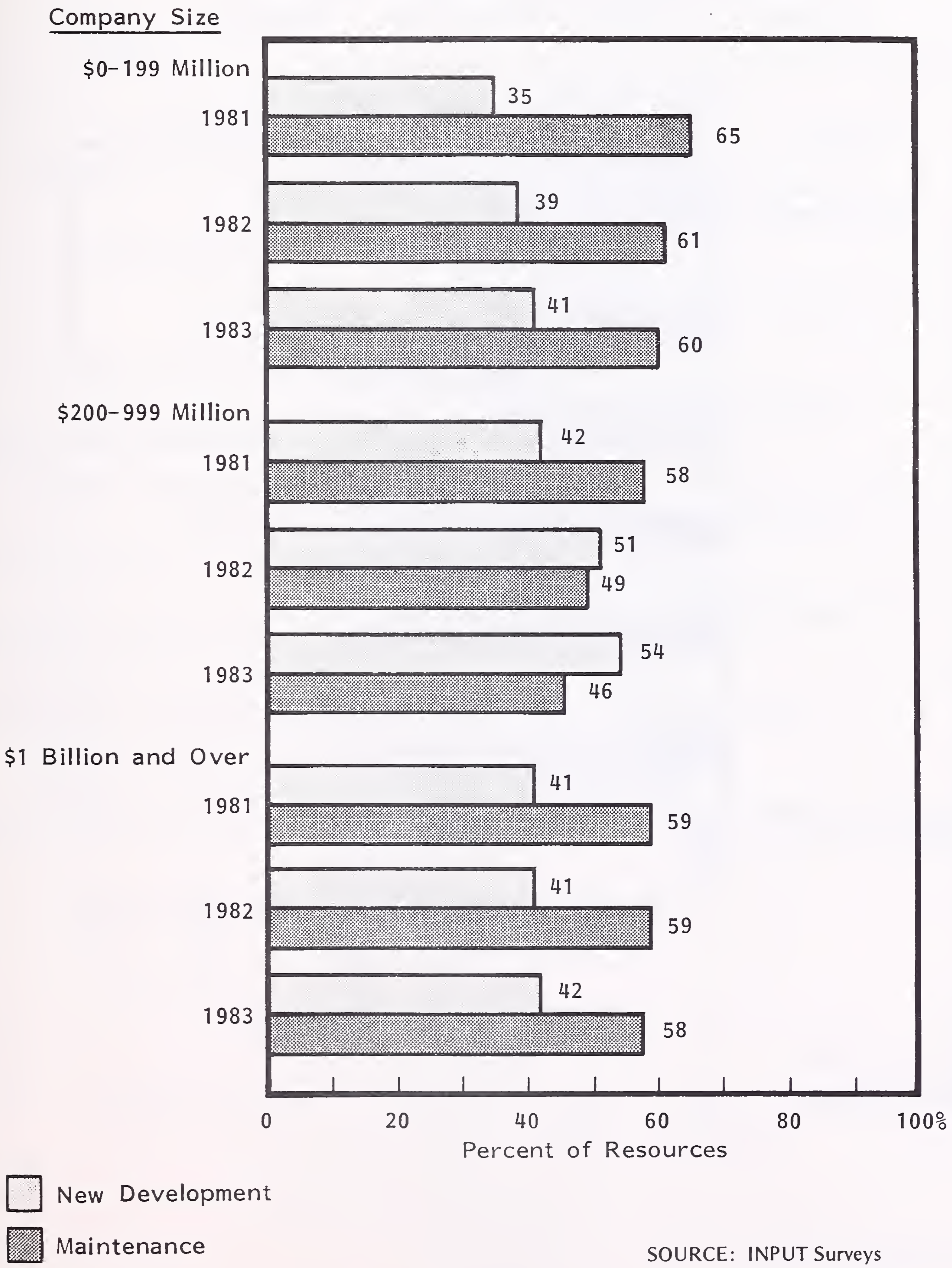
1981-1983



SOURCE: INPUT Surveys

EXHIBIT III-10

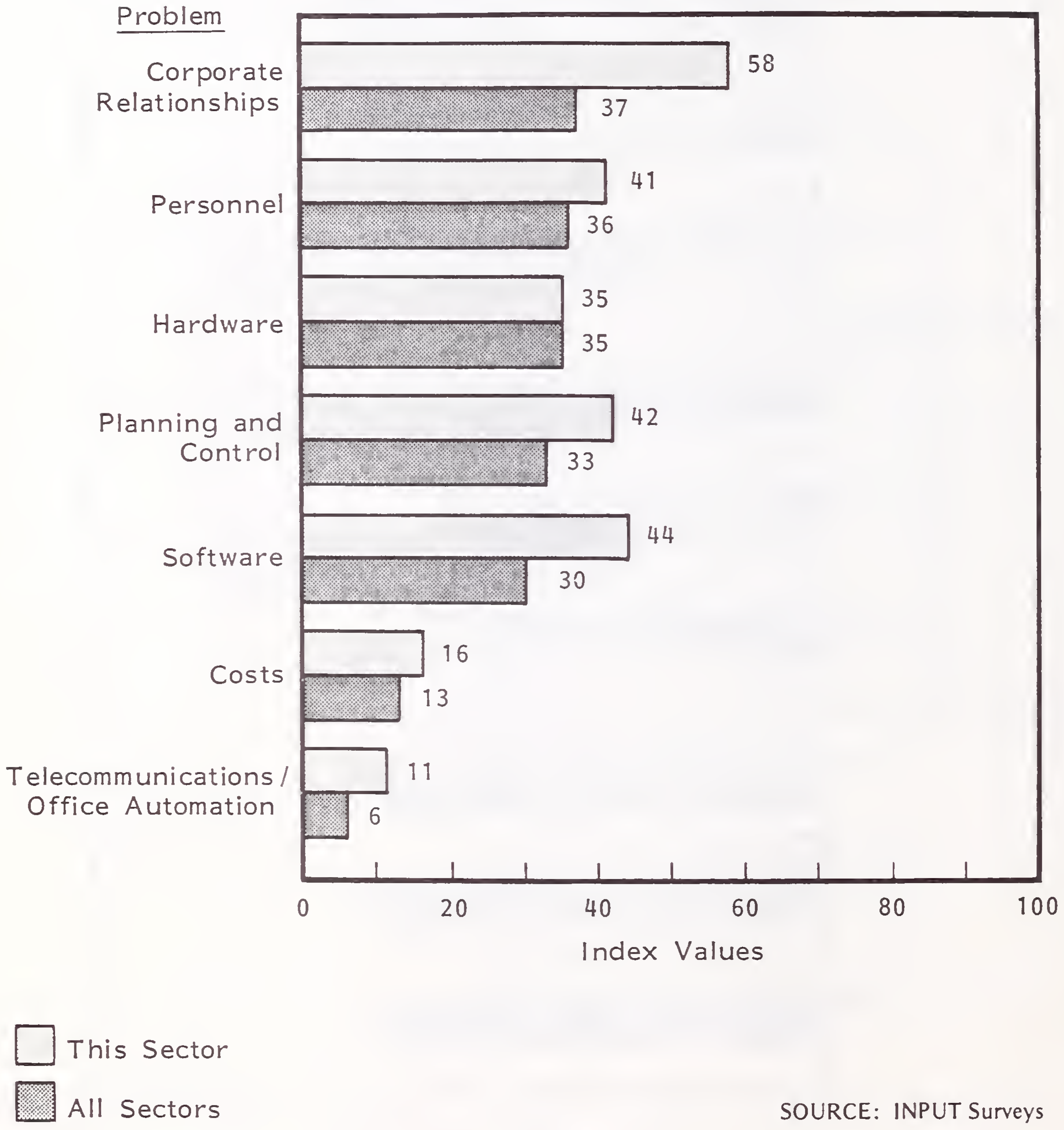
NEW PROGRAM DEVELOPMENT VERSUS MAINTENANCE IN THE DISCRETE MANUFACTURING SECTOR, 1981-1983



SOURCE: INPUT Surveys

EXHIBIT III-11

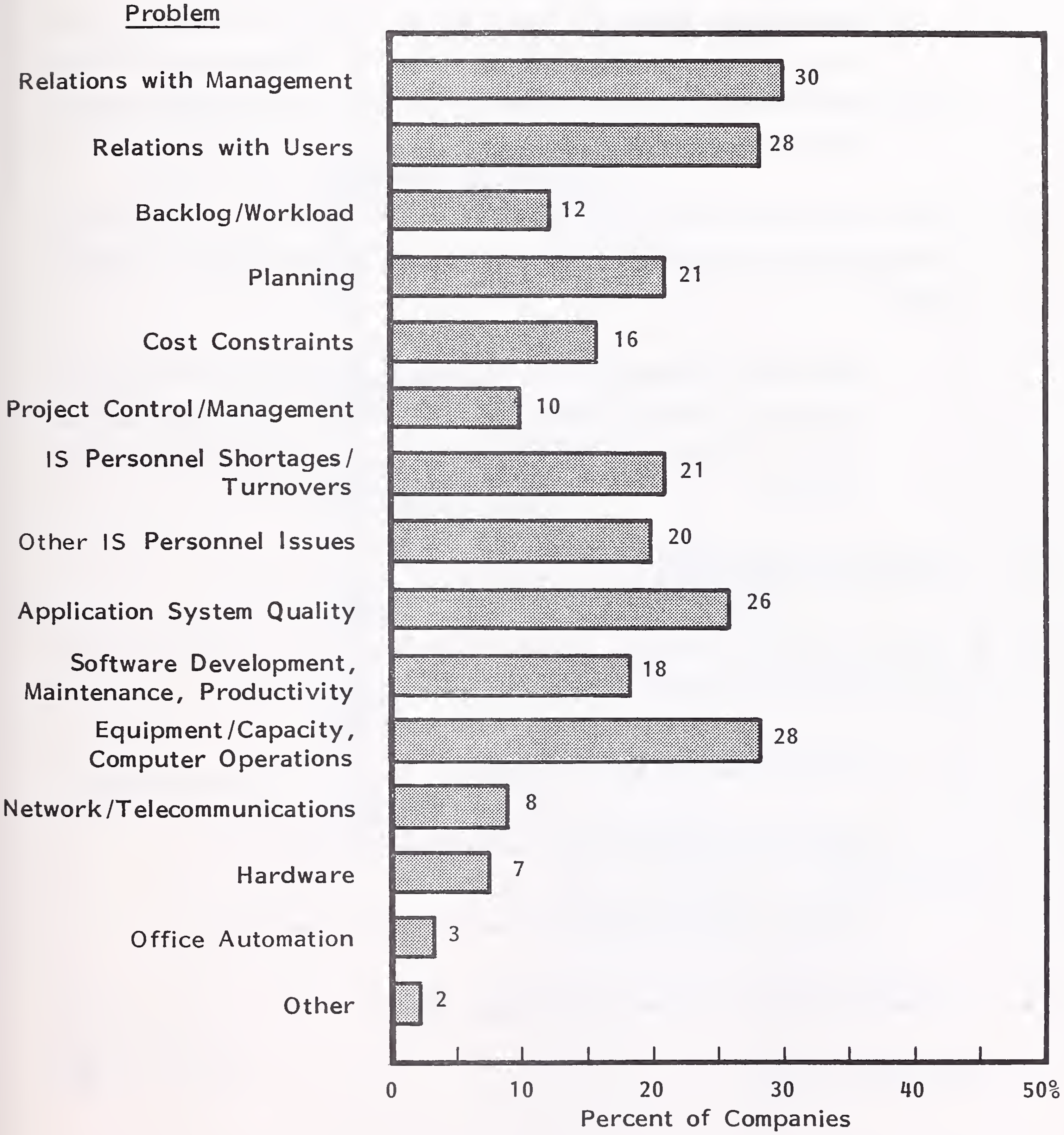
INFORMATION SYSTEMS PROBLEMS IN THE DISCRETE MANUFACTURING SECTOR: SUMMARY



SOURCE: INPUT Surveys

EXHIBIT III-12

INFORMATION SYSTEMS PROBLEMS IN THE DISCRETE MANUFACTURING SECTOR: DETAIL



SOURCE: INPUT Surveys

- The "objectives" profile is quite similar to the all-industry profile, with somewhat more stress on planning and control and telecommunications/office automation, as shown in Exhibit III-13.

  - More detailed information about specific planning objectives is contained in Exhibit III-14. This exhibit shows the percentage of companies in this sector which have identified particular planning objectives as being of major importance to them.

- Much more stress is being placed in this sector on initiatives involving corporate relationships and personnel than in most other sectors, as shown in Exhibit III-15.

  - More detailed information about specific areas where an initiative is planned is contained in Exhibit III-16. This exhibit shows the percentage of companies in this sector planning a major initiative in a particular area.

4. PERSONAL COMPUTERS

- Plans for the use of personal computers in the discrete manufacturing sector area are shown in Exhibit III-17 and include:

  - The overall level of use in five years.

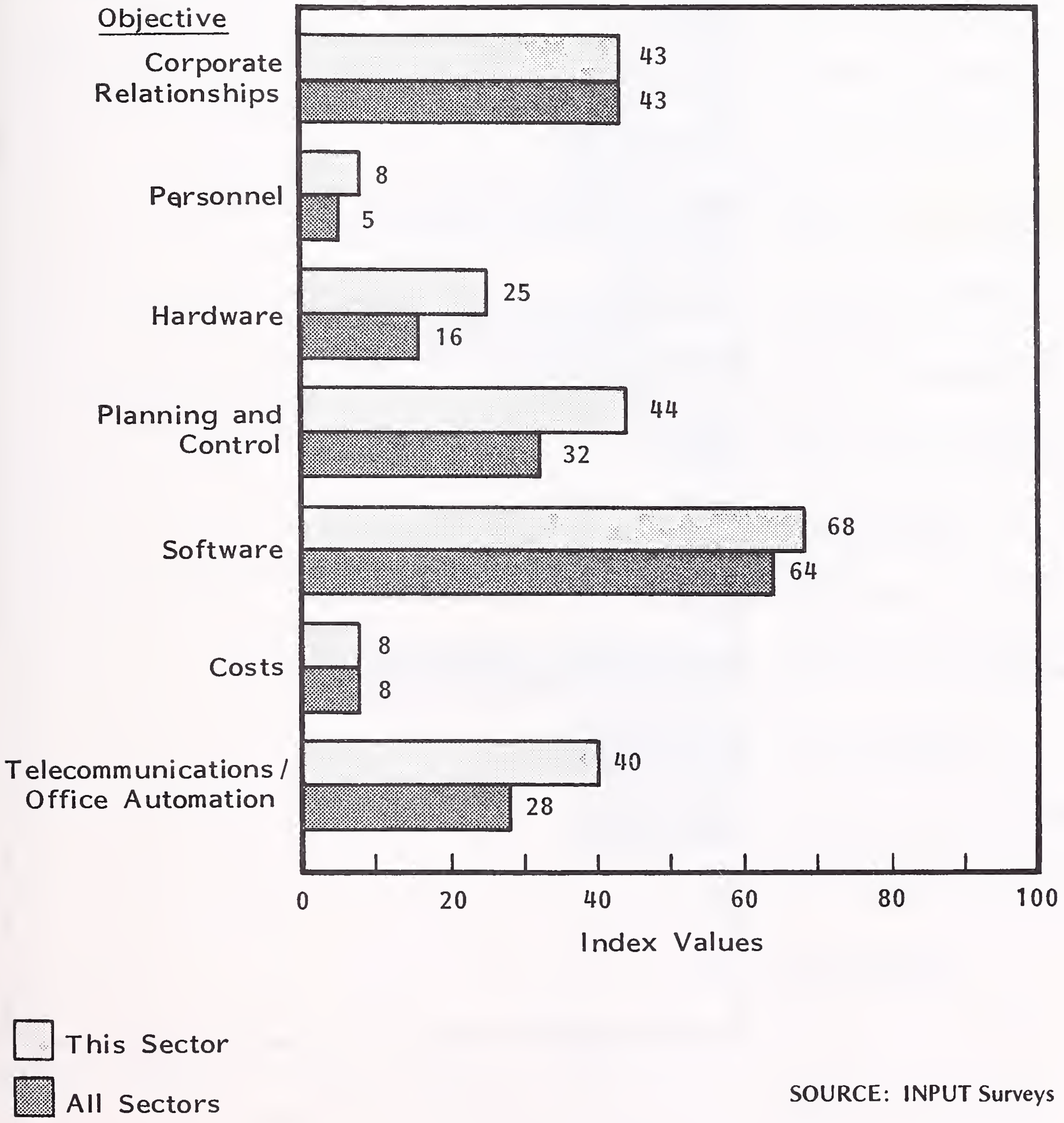
  - Plans for obtaining additional personal computer software.

  - Plans for obtaining additional personal computer hardware.

- These are all quite close to the all-industry figures.

EXHIBIT III-13

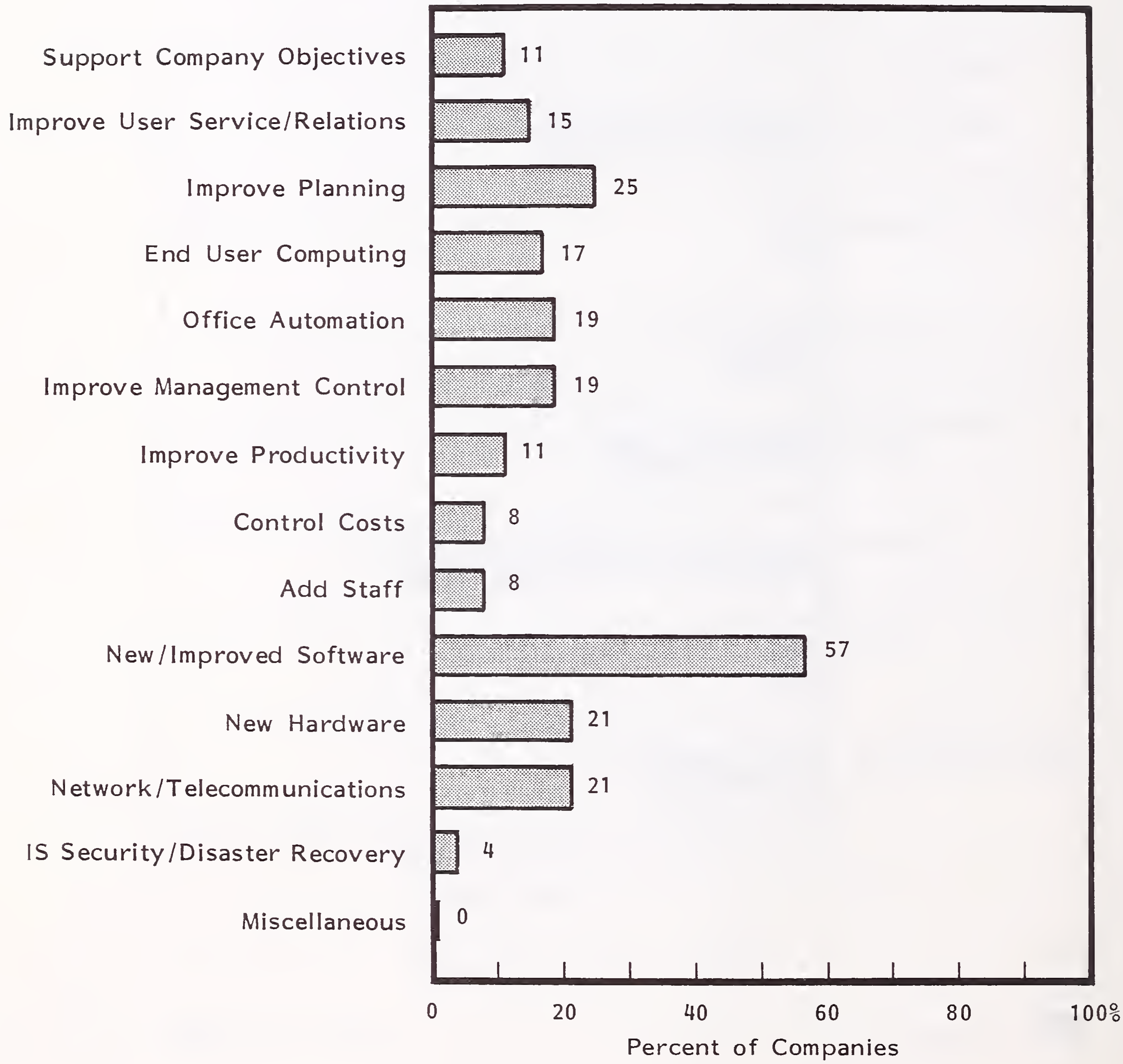
INFORMATION SYSTEMS OBJECTIVES IN THE DISCRETE MANUFACTURING SECTOR: SUMMARY



SOURCE: INPUT Surveys

EXHIBIT III-14

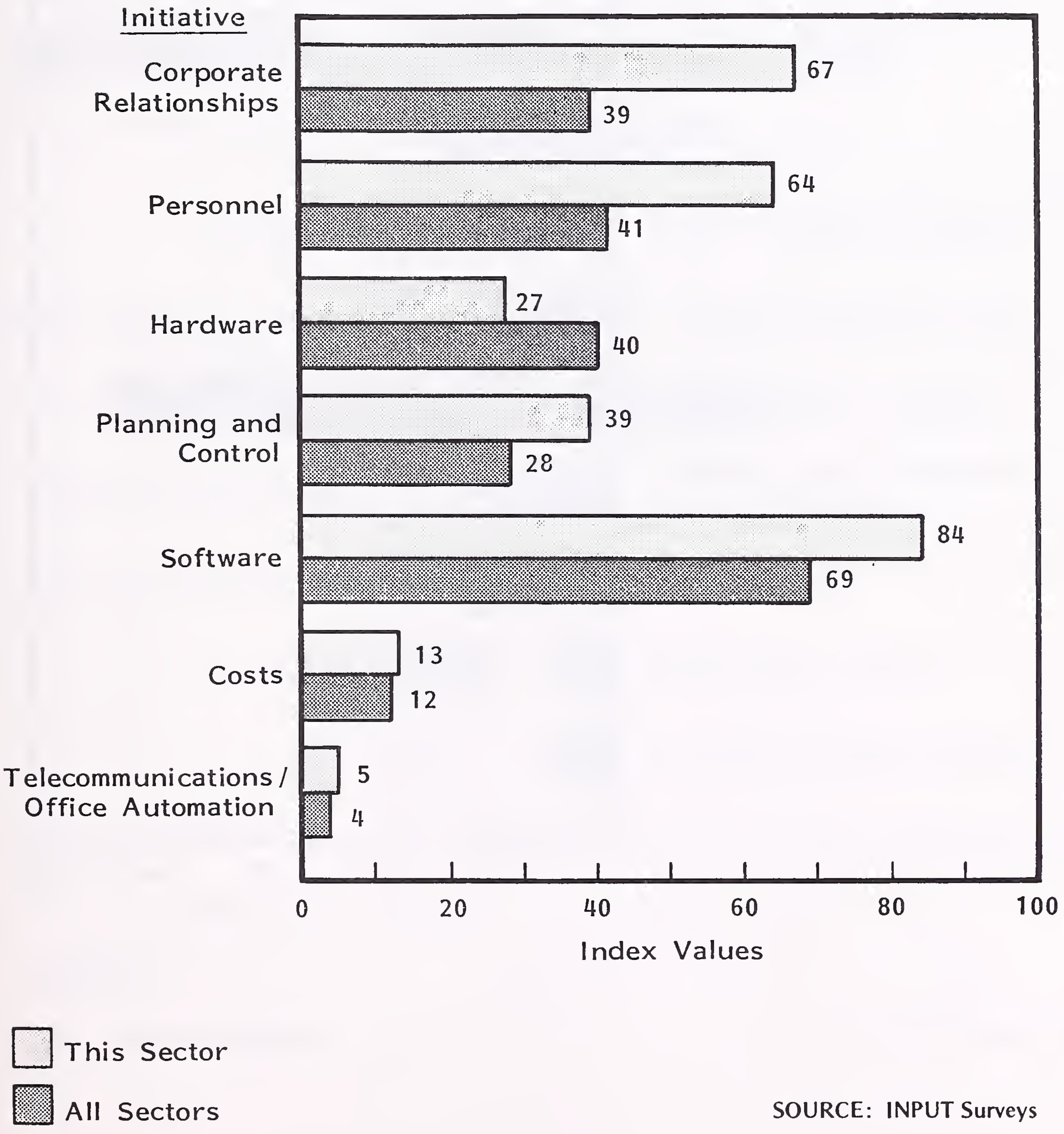
INFORMATION SYSTEMS PLANNING OBJECTIVES IN THE DISCRETE MANUFACTURING SECTOR: DETAIL



SOURCE: INPUT Surveys

EXHIBIT III-15

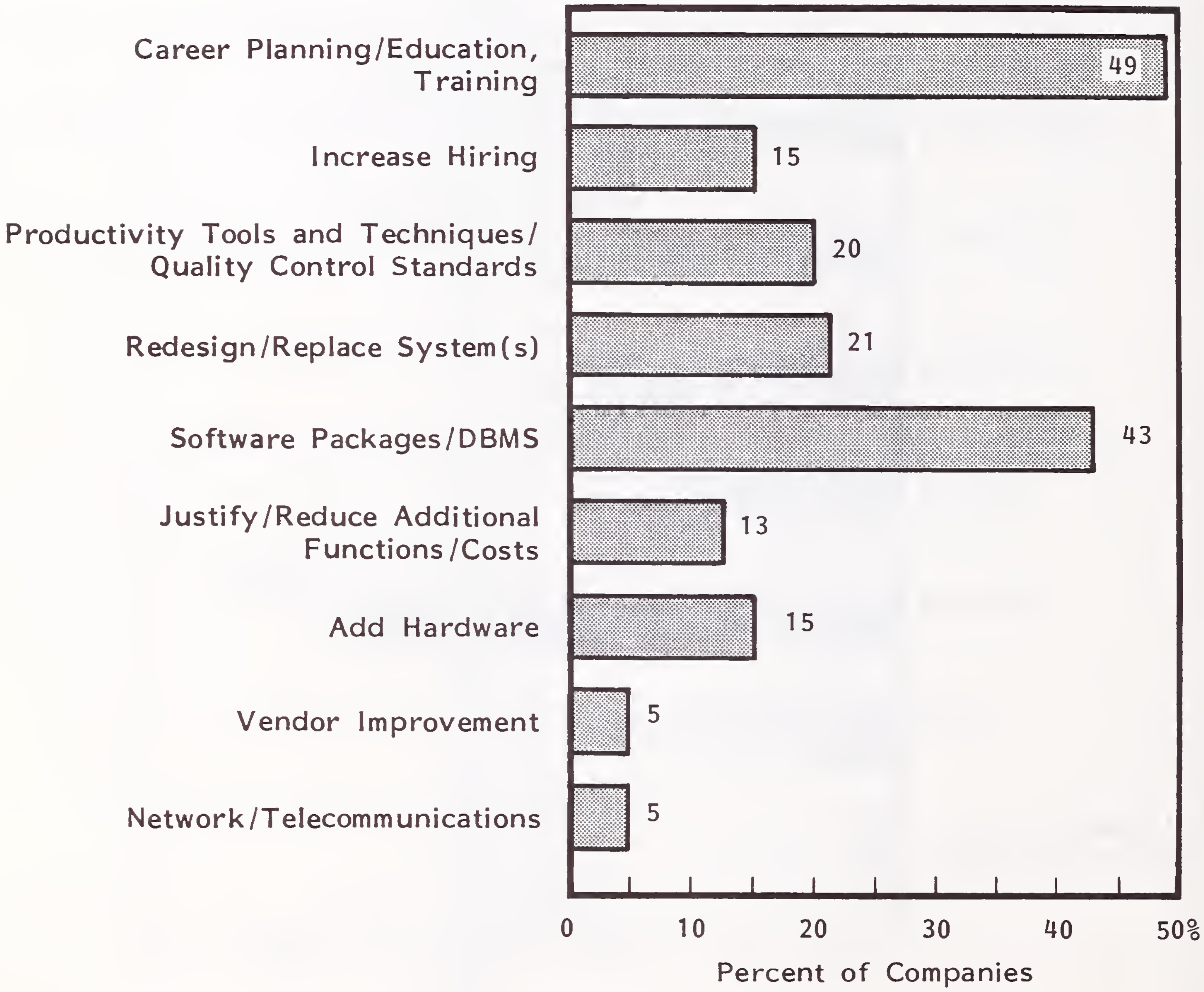
INFORMATION SYSTEMS INITIATIVES IN THE DISCRETE MANUFACTURING SECTOR: SUMMARY



SOURCE: INPUT Surveys

EXHIBIT III-16

INFORMATION SYSTEMS INITIATIVES PLANNED IN THE DISCRETE MANUFACTURING SECTOR: DETAIL

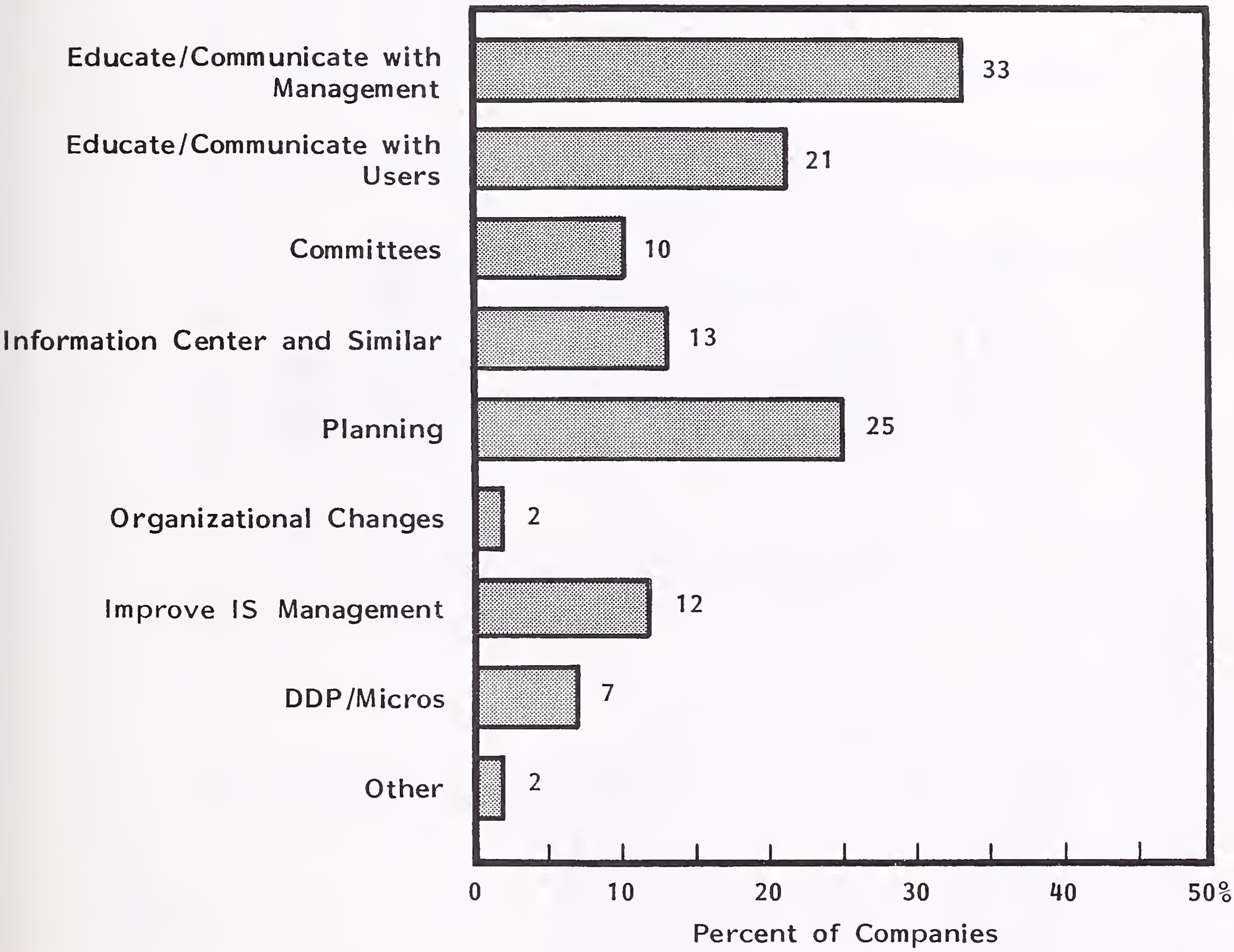


Continued

SOURCE: INPUT Surveys

EXHIBIT III-16 (Cont.)

INFORMATION SYSTEMS INITIATIVES PLANNED IN THE DISCRETE MANUFACTURING SECTOR: DETAIL

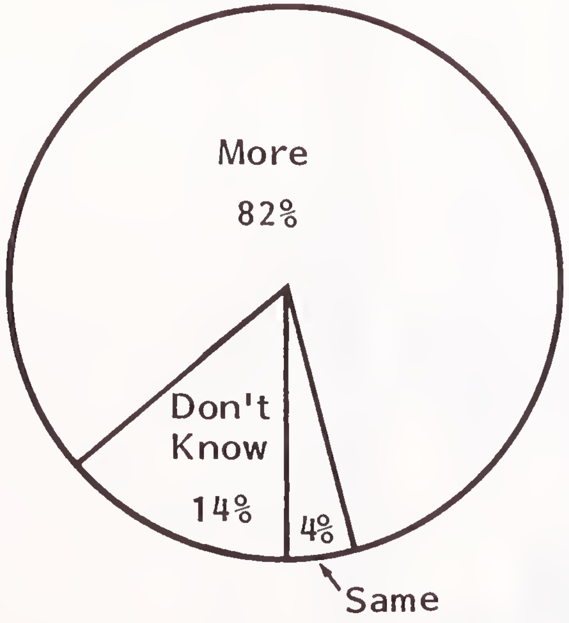


SOURCE: INPUT Surveys

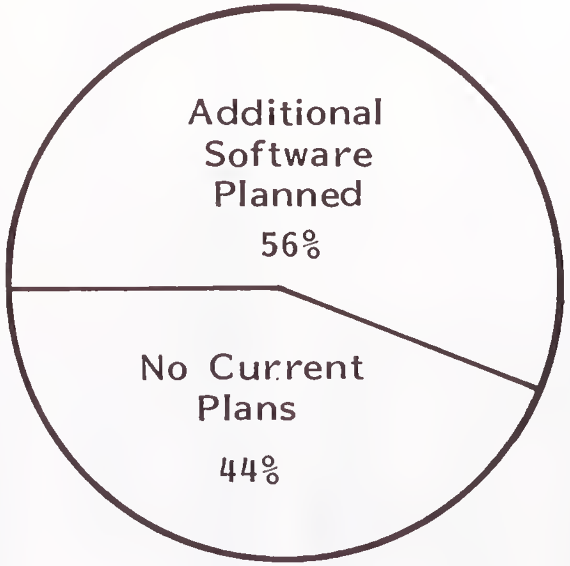
EXHIBIT III-17

PERSONAL COMPUTER ACQUISITION PLANS IN THE DISCRETE MANUFACTURING SECTOR

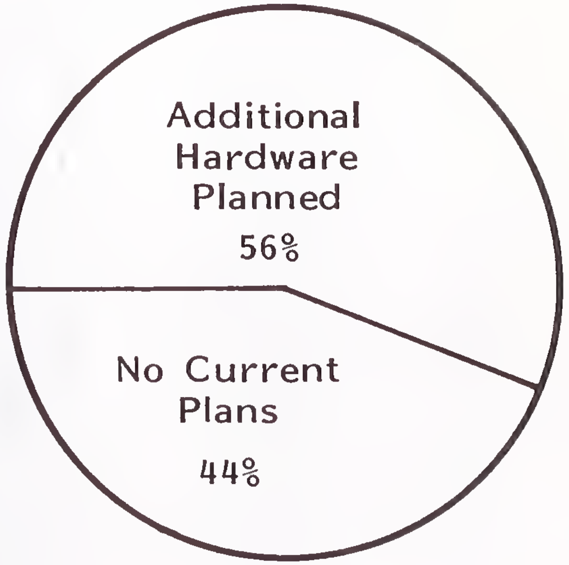
Expected Level of Use of Personal Computers in Five Years

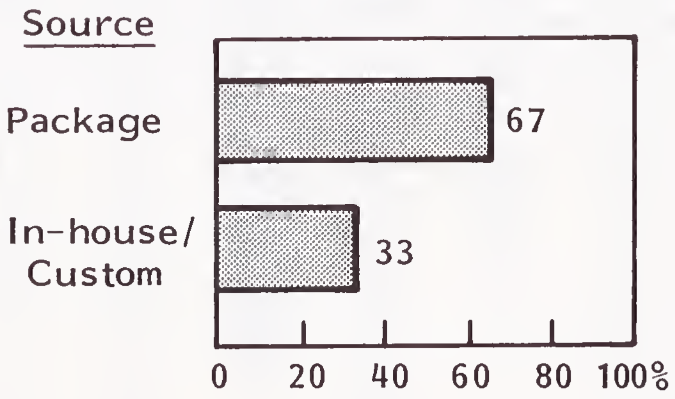


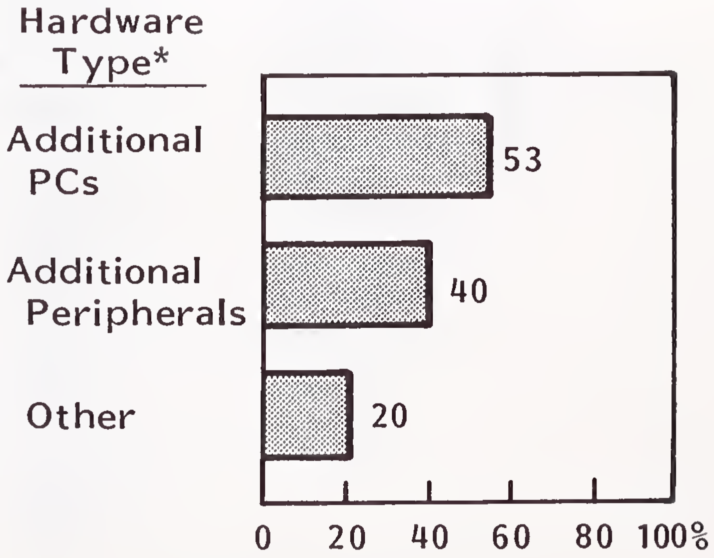
User Plans for Additional Personal Computer Software



User Plans for Additional Personal Computer Hardware







*Totals more than 100% because of multiple plans

SOURCE: INPUT Surveys

- Exhibit III-18 shows the types of personal computer software packages now used.

  - With minor variations, this is close to the all-industry profile.

- The general categories of applications used are summarized in Exhibit III-19. This sector's profile is different in a number of respects:

  - Budgeting, financial, and data base applications are less prevalent.

  - Applications to directly support operations are much more important.

  - Exhibit III-20 provides examples of actual personal computer applications in use in the discrete manufaturing sector.

- Compared to the average user, personal computer users in this sector are even less likely to rely on the IS department for assistance, as shown in Exhibit III-21.

- In this sector 76% of departments using personal computers have had their installation less than a year, as shown in Exhibit III-22, compared to 78% generally.

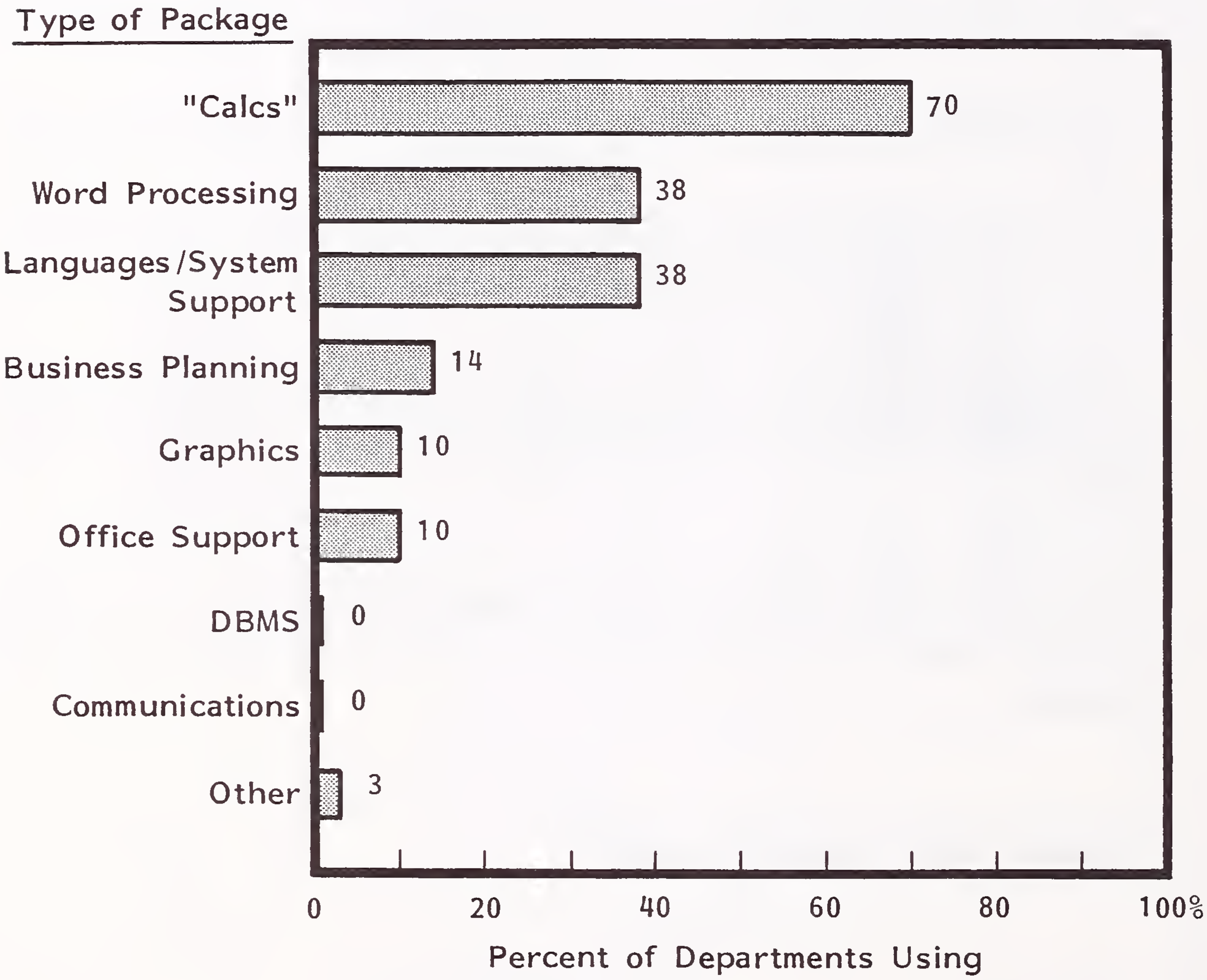
C. PROCESS MANUFACTURING SECTOR

1. BUDGETS

- In this sector 52% of the companies expect budget increases in 1983, compared to 61% generally; 17% expect a decrease compared to 8% generally, as shown in Exhibit III-23.

EXHIBIT III-18

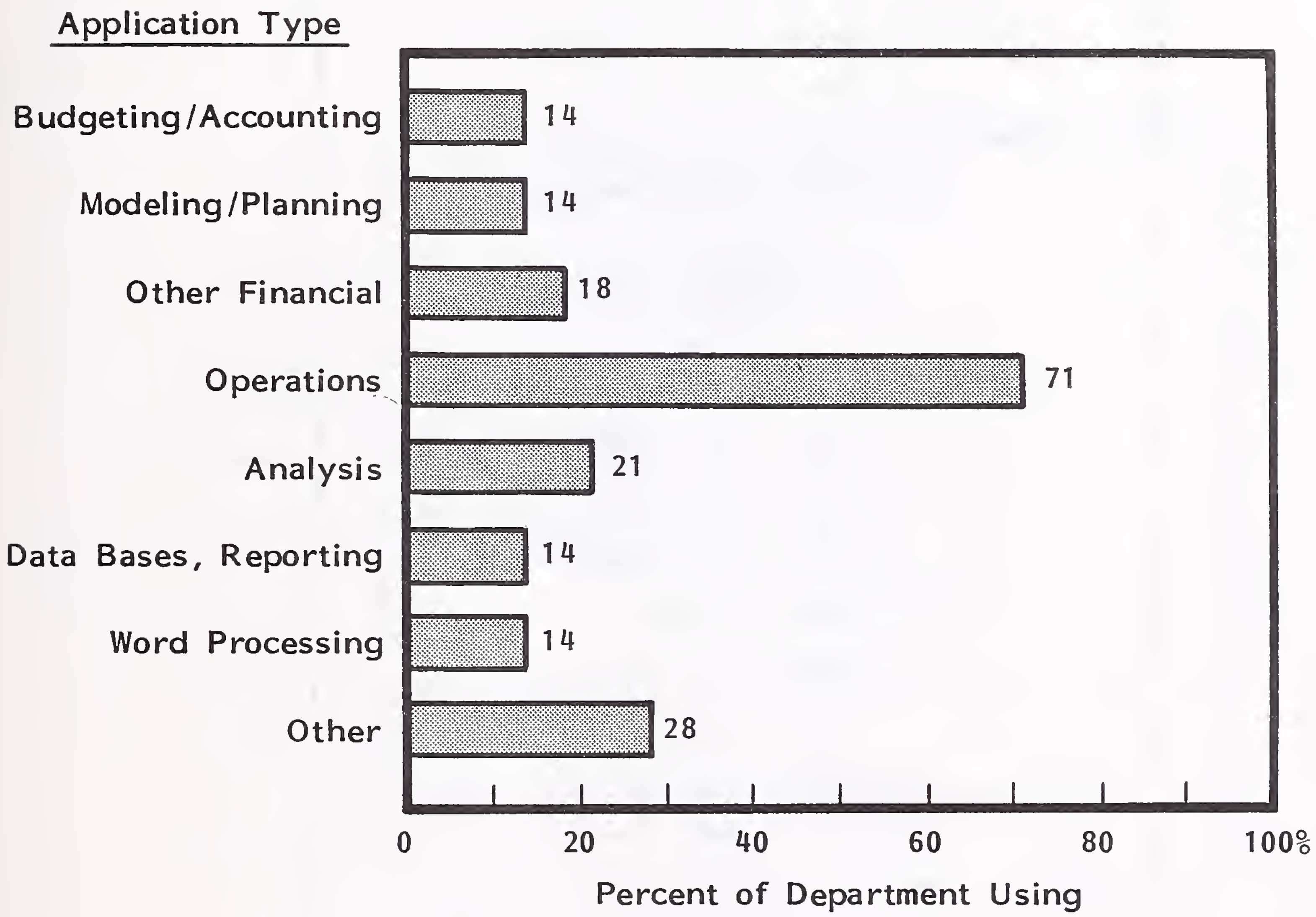
TYPES OF PERSONAL COMPUTER SOFTWARE PACKAGES USED BY THE DISCRETE MANUFACTURING SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-19

PERSONAL COMPUTER APPLICATIONS IN THE DISCRETE MANUFACTURING SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-20

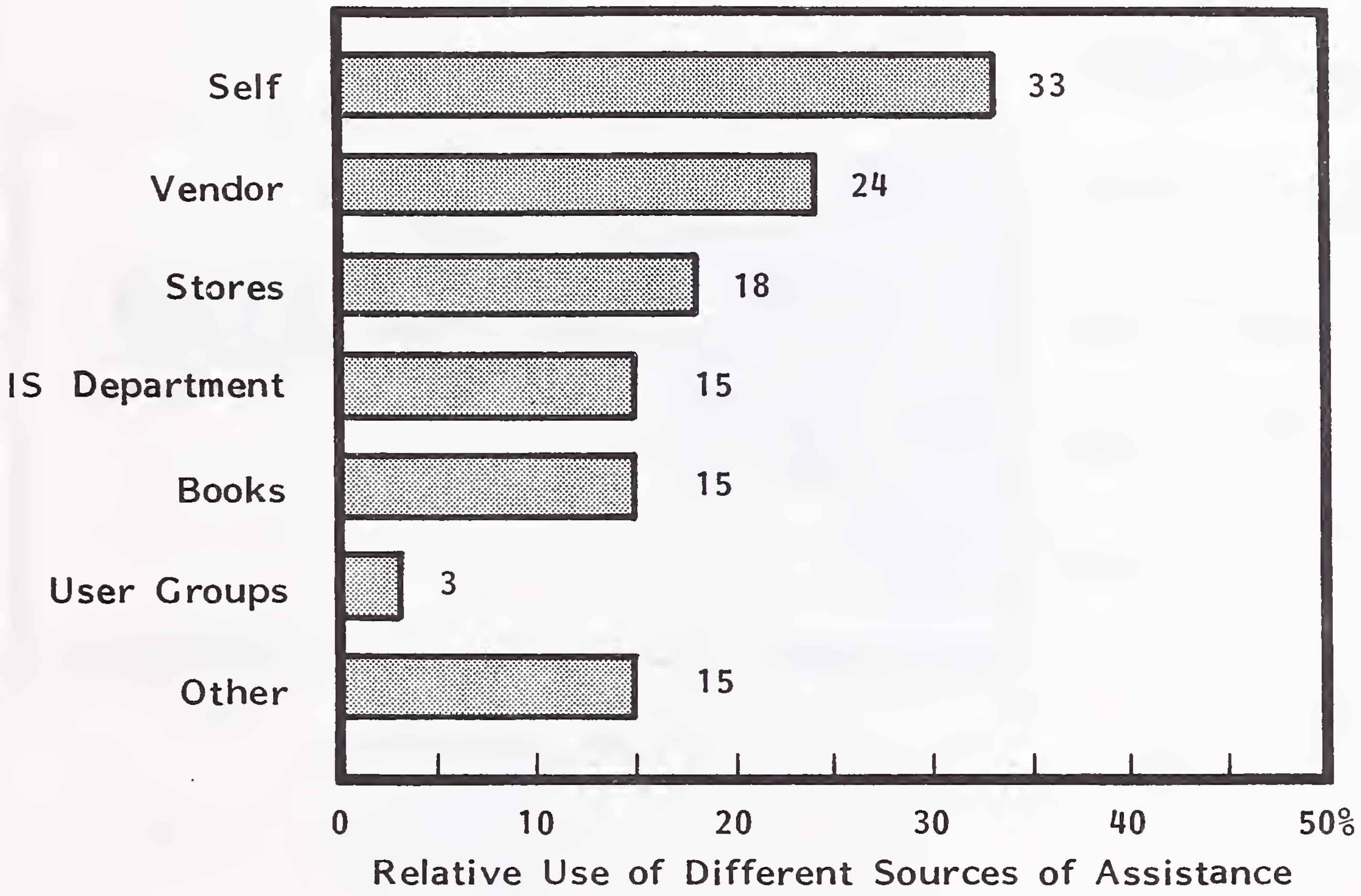
PERSONAL COMPUTER APPLICATIONS IN THE DISCRETE MANUFACTURING SECTOR

Inventory Control
Order Entry
Word Processing
Correspondence
Manager Performance Comparisons
Interest Rate Analysis
Designing Tools for Test Equipment
Budget Management
Records
Financial Modeling
Filing
List Compilation
Profit and Loss
Report Writing
Project Estimates
Sales History
Historical Records
Data Analysis
Engineering Analysis
Used Equipment Survey
Modeling Shop Reports
Scheduling Factory Inventory Levels
Business Planning
Price Development
Qualitative Analysis
Financial Forecasting
Shipment Plotting
Foreign Tax Computation
Graphics
Mailing

SOURCE: INPUT Surveys

EXHIBIT III-21

SOURCES OF ASSISTANCE FOR PERSONAL COMPUTER USERS IN THE DISCRETE MANUFACTURING SECTOR

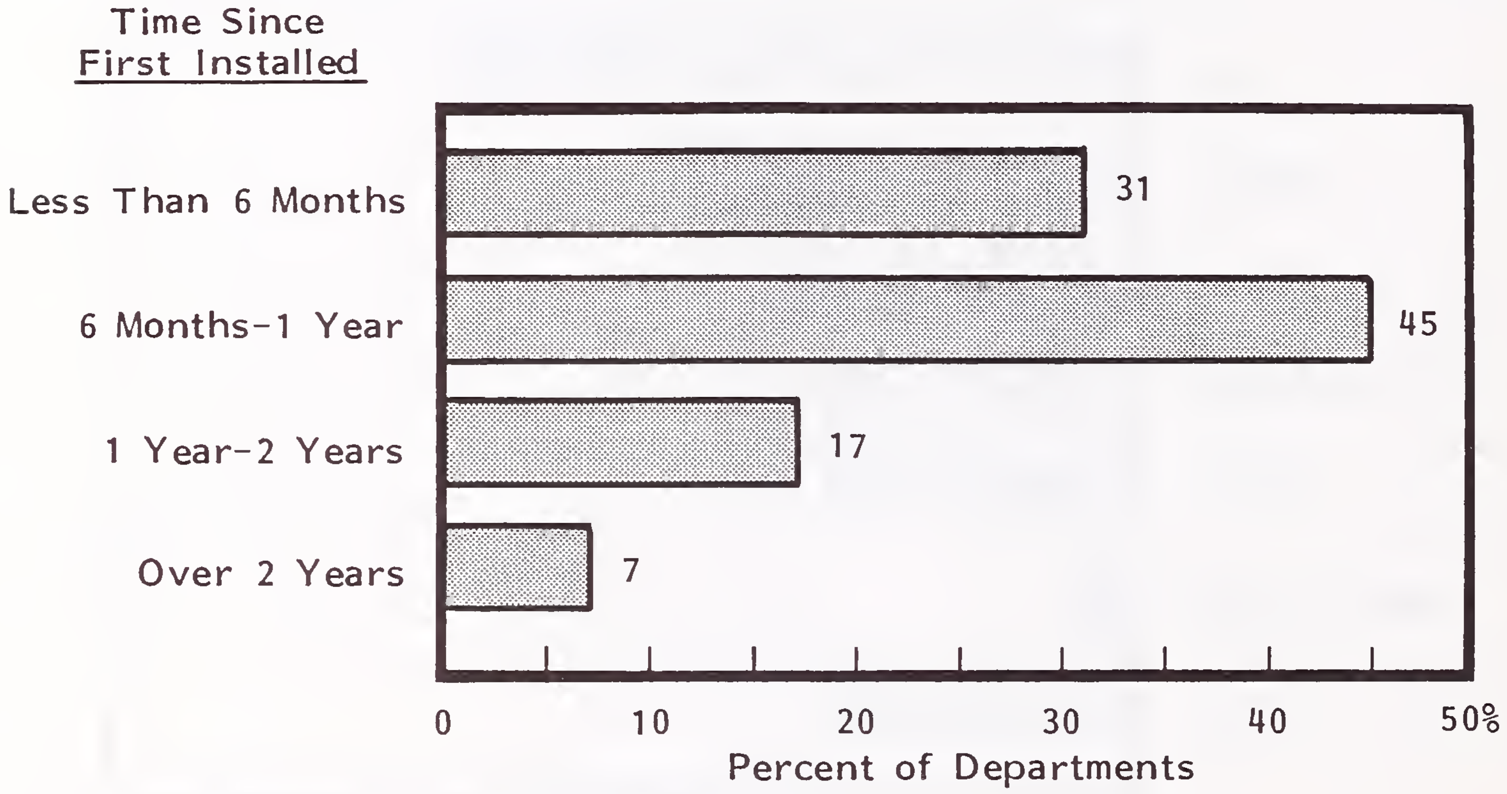


Note: Total Is More Than 100% Because of Multiple Sources.

SOURCE: INPUT Surveys

EXHIBIT III-22

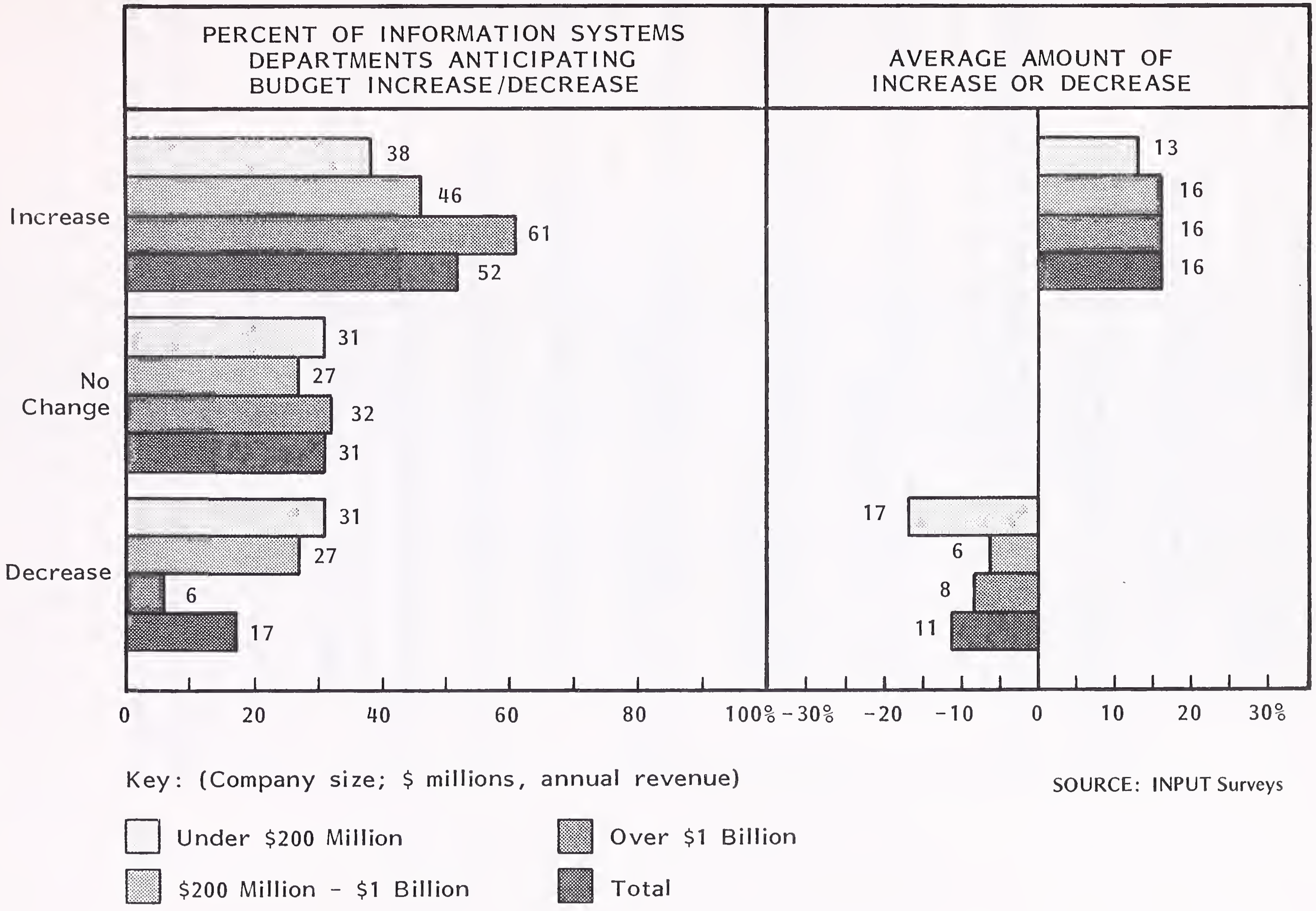
TIME SINCE FIRST PERSONAL COMPUTER INSTALLED IN USER DEPARTMENTS IN THE DISCRETE MANUFACTURING SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-23

ANTICIPATED BUDGET INCREASES FOR 1983 IN PROCESS MANUFACTURING



SOURCE: INPUT Surveys

  - Companies expecting to increase their budgets foresee an average rise of 16%.

  - Companies anticipating decreases expect their budgets to drop by 11%.

- The budget increases expected vary by company size.

  - Large companies: 61% expect increases in the process manufacturing sector, compared to 63% for large companies generally.

  - Medium companies: 46% expect increases, compared to 63% for medium companies generally.

  - Small companies: 38% expect increases, compared to 57% for small companies generally.

- The average budget growth expected for 1983 in the process manufacturing sector is 6%, compared to 15% in 1982.

  - This represents a decline of 59% in the average rate of growth.

- The 1982 IS budget distribution is shown in Exhibit III-24.

- The largest changes are expected in the following budget categories:

  - Large increases for mini/microcomputers and terminals.

  - A significant drop in outside processing services.

- Exhibit III-25 shows the range of the ratios between the IS budget and the company's total revenues which exist in the process manufacturing sector.

EXHIBIT III-24

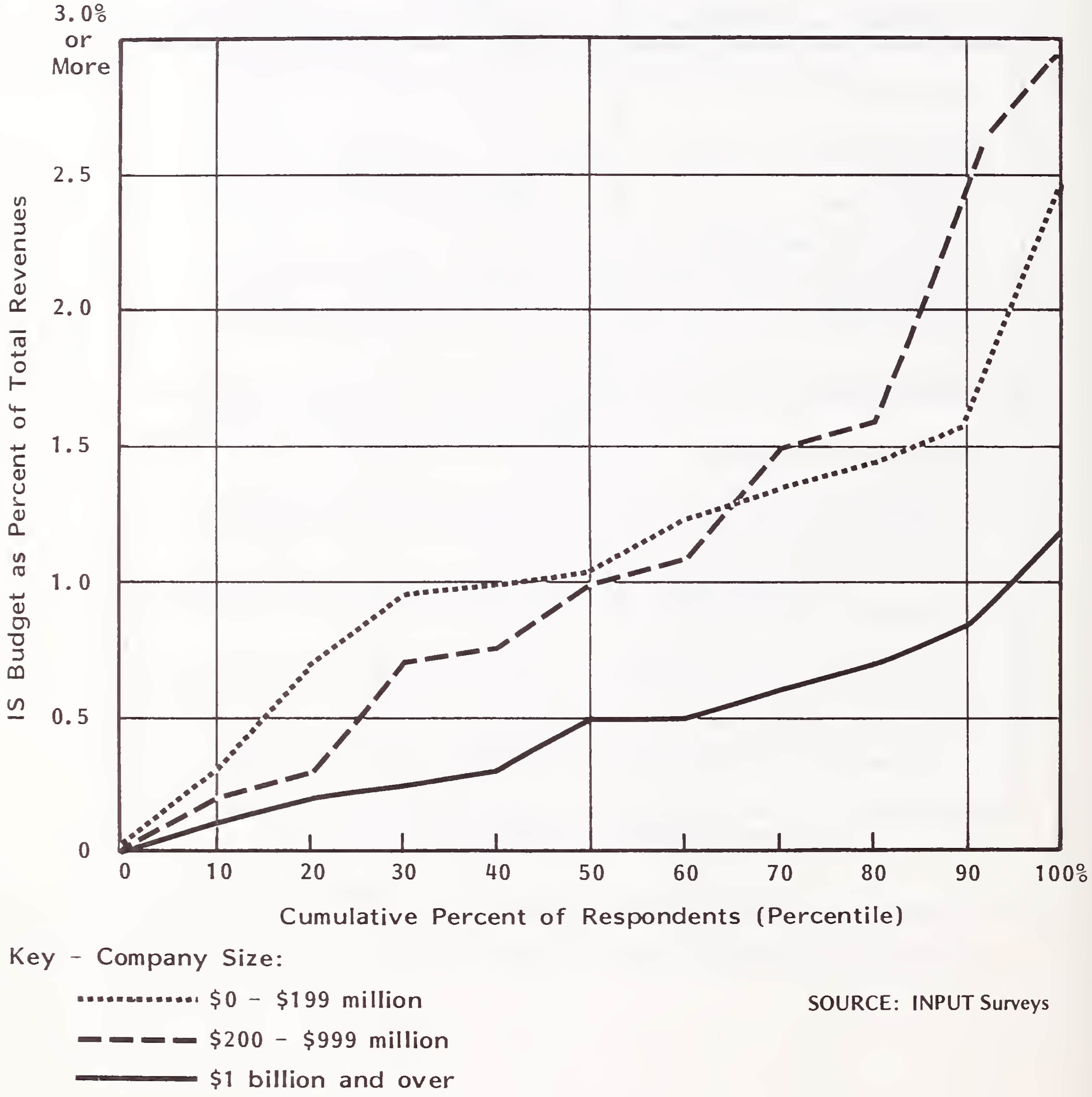
1982 BUDGET DISTRIBUTIONS AND 1982/1983 CHANGES IN THE PROCESS MANUFACTURING SECTOR

BUDGET CATEGORY	PERCENT OF I.S. BUDGET (1982)	EXPECTED CHANGE 1982 to 1983
Personnel	42%	4%
Hardware		
Mainframe	14	3
Mini/Microcomputer	1	101
Terminals	5	26
Peripherals	5	3
Communications	9	6
Software and Services		
Software	5	8
Processing Services	2	-17
Software Maintenance	1	9
Hardware Maintenance	3	2
Other	13	7
Total	100%	6%

SOURCE: INPUT Surveys

EXHIBIT III-25

INFORMATION SYSTEMS BUDGET AS A PERCENT OF TOTAL REVENUES IN THE PROCESS MANUFACTURING SECTOR



SOURCE: INPUT Surveys

- The IS percentage of total revenues for the average company (i.e., at the 50th percentile) in each size group was:
  - For large companies: 0.5%, compared to 0.55% for this size company generally.
  - For medium companies: 1.0%, compared to 0.8% for this size company generally.
  - For small companies: 1.1%, compared to 1.2% for this size company generally.
- The companies that spend least on data processing as a percentage of revenues are those at and below the 20th percentile. Taking the 10th percentile as representative, their IS spending percentages were:
  - Large companies: 0.1%.
  - Medium companies: 0.2%.
  - Small companies: 0.3%.
- The companies that spend the most on data processing as a percentage of revenues are those at and above the 80th percentile. Taking the 90th percentile as representative, their IS spending percentages were:
  - Large companies: 0.8%.
  - Medium companies: 2.5%.
  - Small companies: 1.6%.

- Median spending on IS per corporate employee was $880. However, there was a broad range of spending ratios, as shown in the diagram in Exhibit III-26.

  - The reasons for this variation were discussed in Chapter II, Section B.

2. STAFFING

- In the process manufacturing sector, 46% of companies expect their IS staffs to increase in the next 12 months, compared to the industry average of 58%, as shown in Exhibit III-27.

  - The net increase in numbers of staff is expected to be 5%, compared to the all-industry average of 4%.

- Turnover in this sector is expected to be 90% of the all-industry average, as shown in Exhibit II-9.

  - Turnover rates for individual positions are shown in Exhibit III-28. For technical positions, the turnover rate is close to the industry average.

- Difficulty in recruiting staff in the process manufacturing sector is seen as more difficult than for companies in general, as shown in Exhibit III-29.

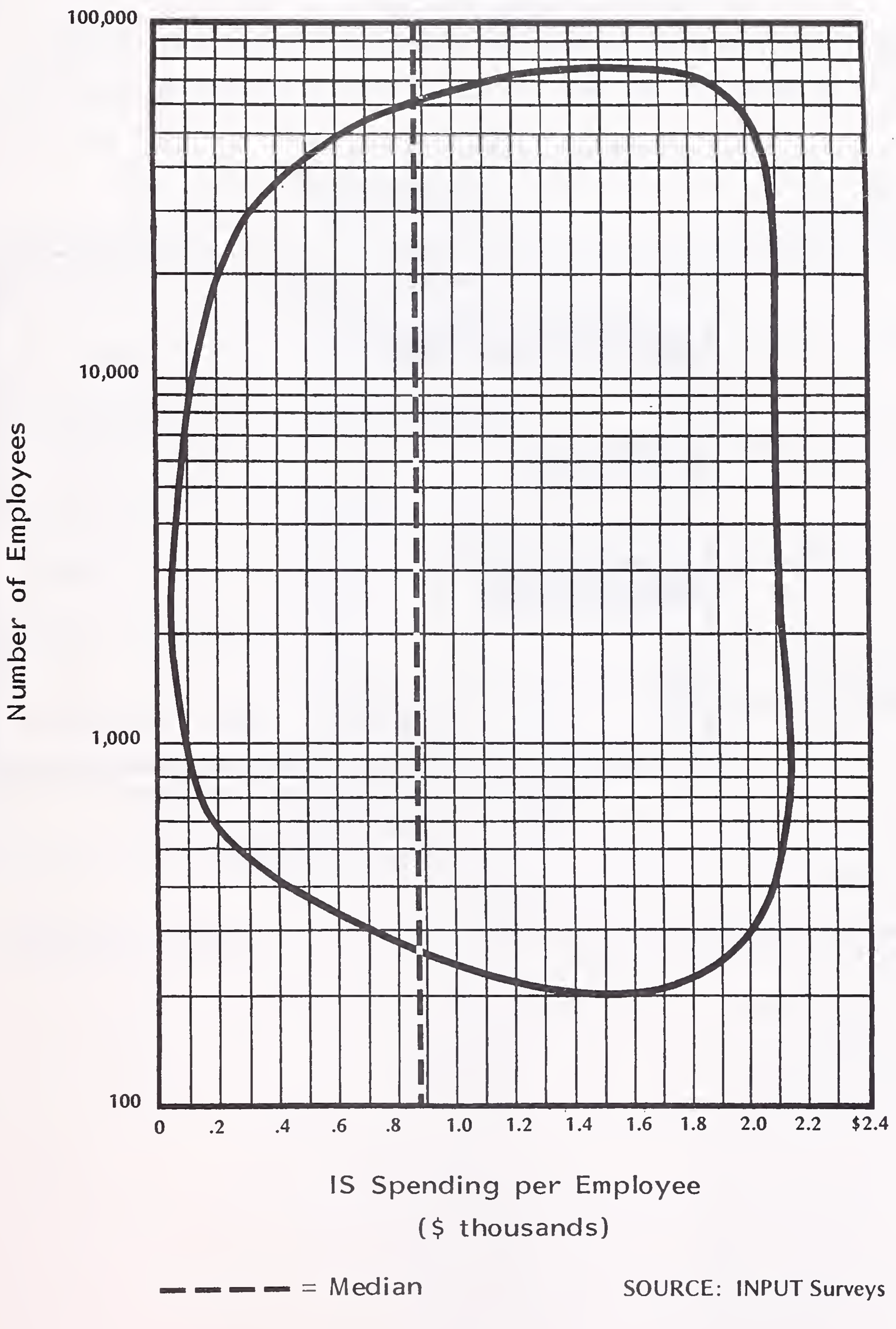
- The number of programs to be maintained averages 1,000 in this sector, although the range, both in absolute numbers and based on company size, is quite broad, as shown in Exhibit III-30.

  - Maintenance, as a proportion of total workload, is stable and very close to industry averages, as shown in Exhibit III-31.

- Company size does seem to affect the amount of maintenance, with large companies performing more than smaller companies. Medium-sized companies apparently believe that they will greatly reduce their maintenance loads from 1982 to 1983, as shown in Exhibit III-32.

EXHIBIT III-26

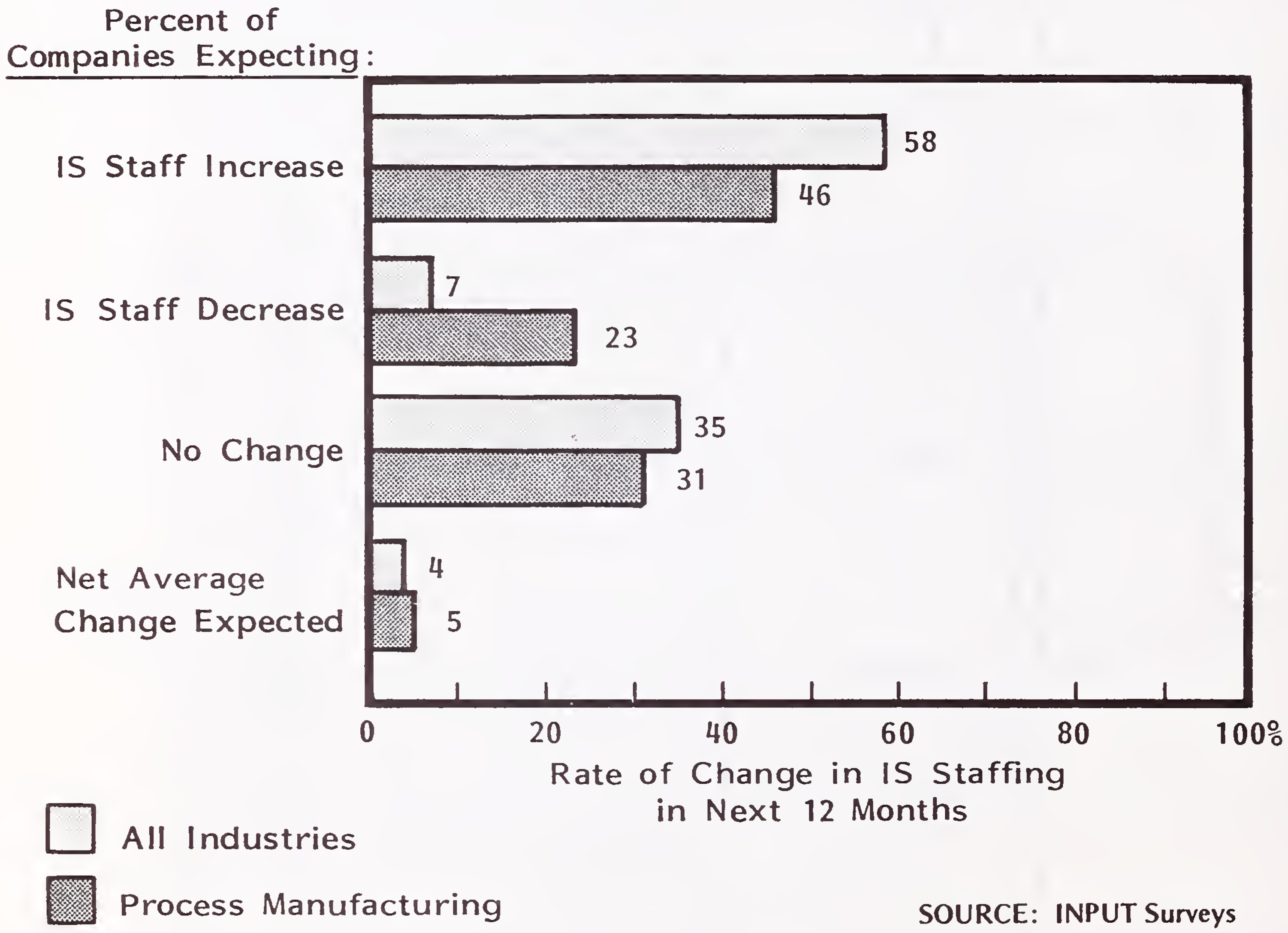
INFORMATION SYSTEMS SPENDING PER EMPLOYEE BY COMPANY SIZE IN THE PROCESS MANUFACTURING SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-27

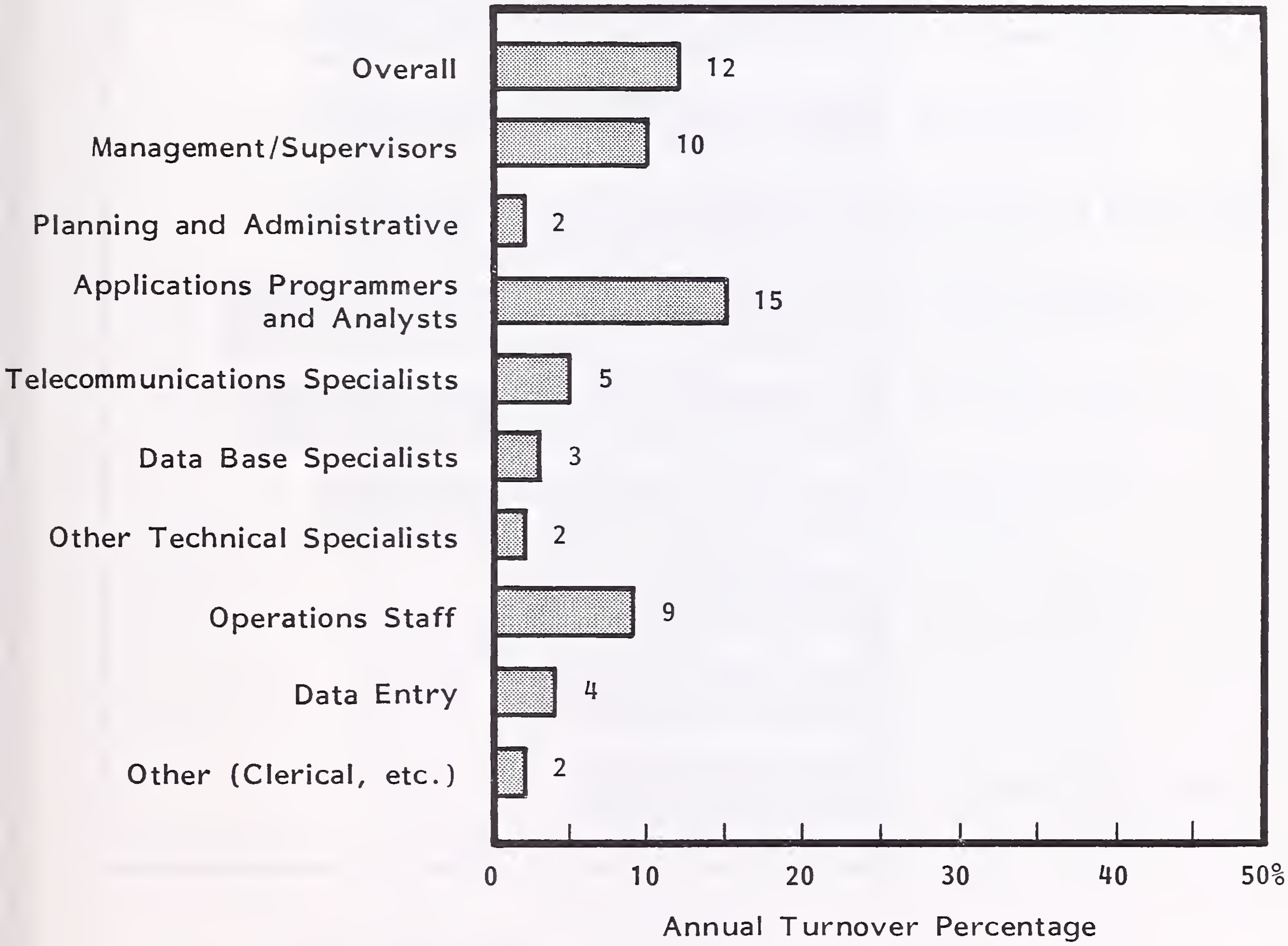
INFORMATION SYSTEMS STAFFING CHANGES EXPECTED IN THE NEXT TWELVE MONTHS IN THE PROCESS MANUFACTURING SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-28

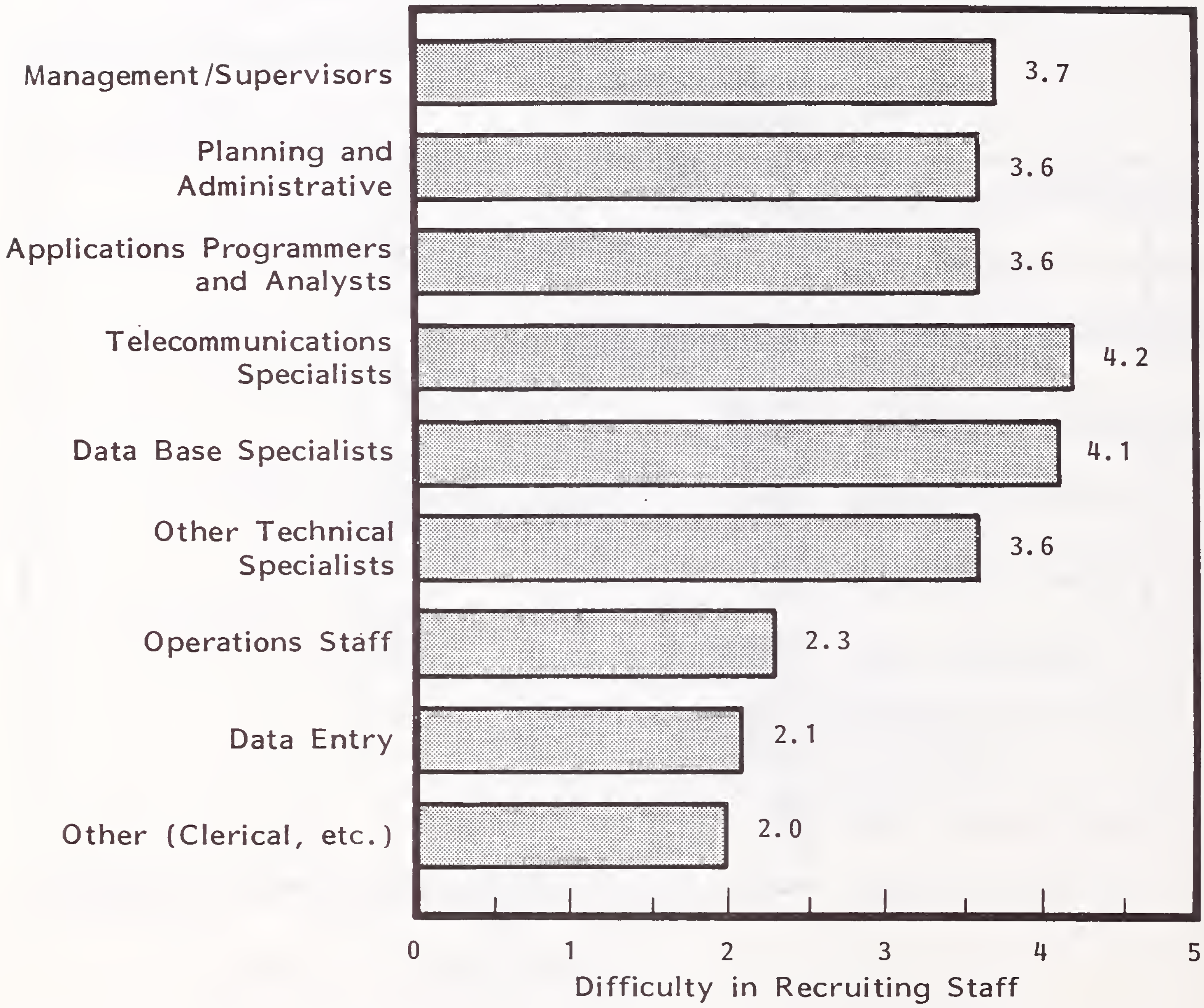
CURRENT ANNUAL TURNOVER IN THE PROCESS MANUFACTURING SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-29

DIFFICULTY IN RECRUITING STAFF IN THE PROCESS MANUFACTURING SECTOR

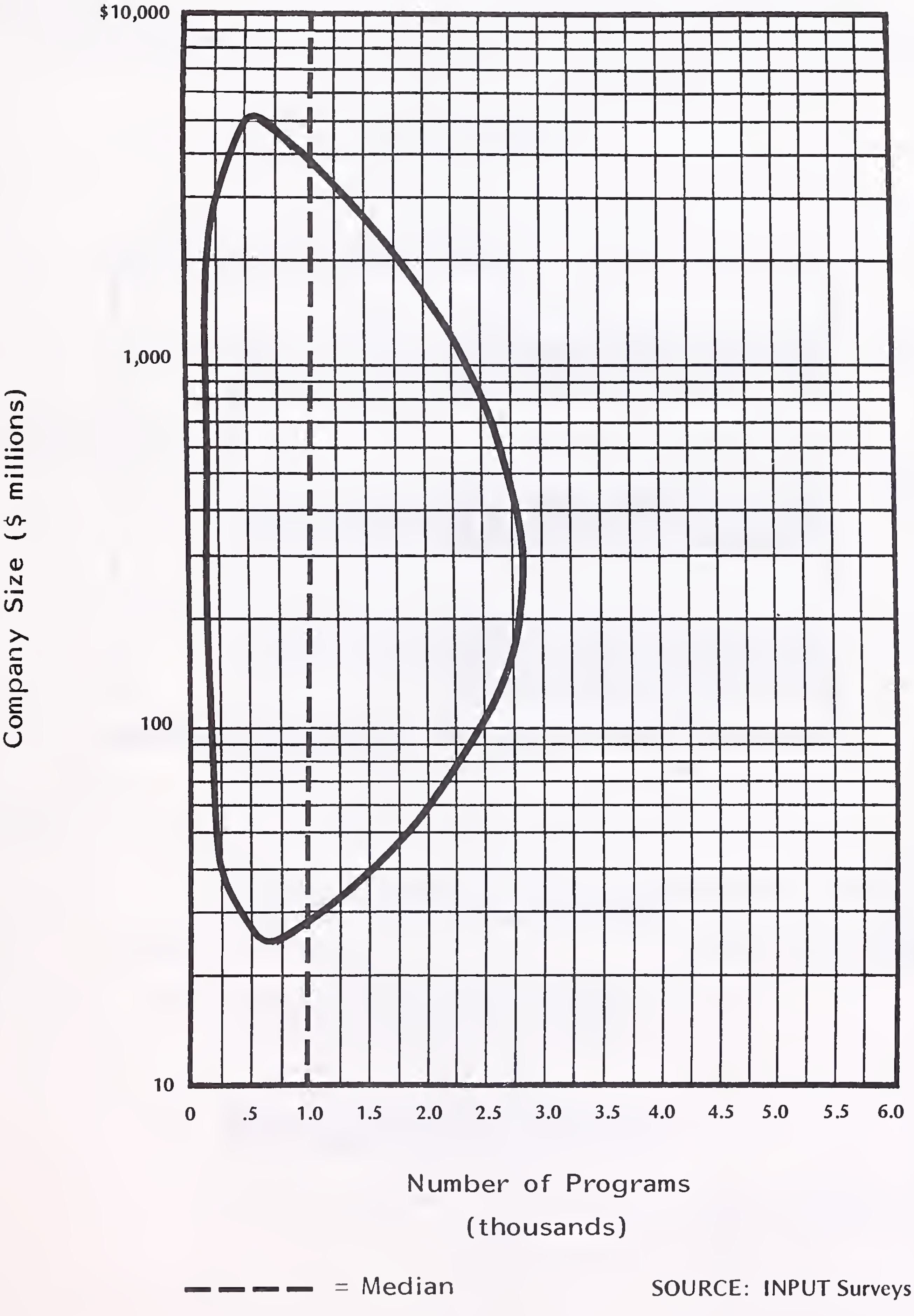


Scale: 1 = Low, 5 = High

SOURCE: INPUT Surveys

EXHIBIT III-30

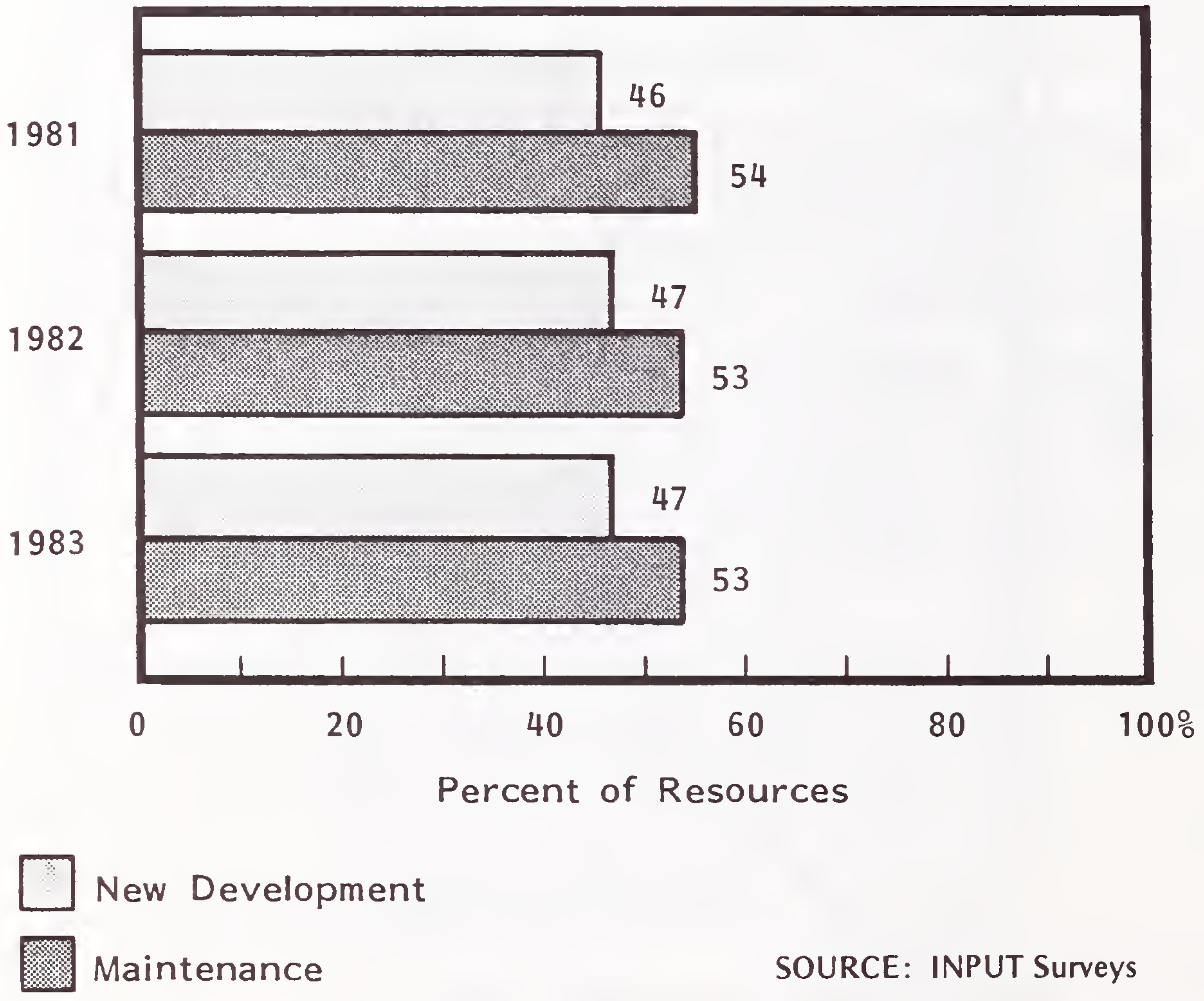
NUMBER OF PROGRAMS BY COMPANY SIZE IN THE PROCESS MANUFACTURING SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-31

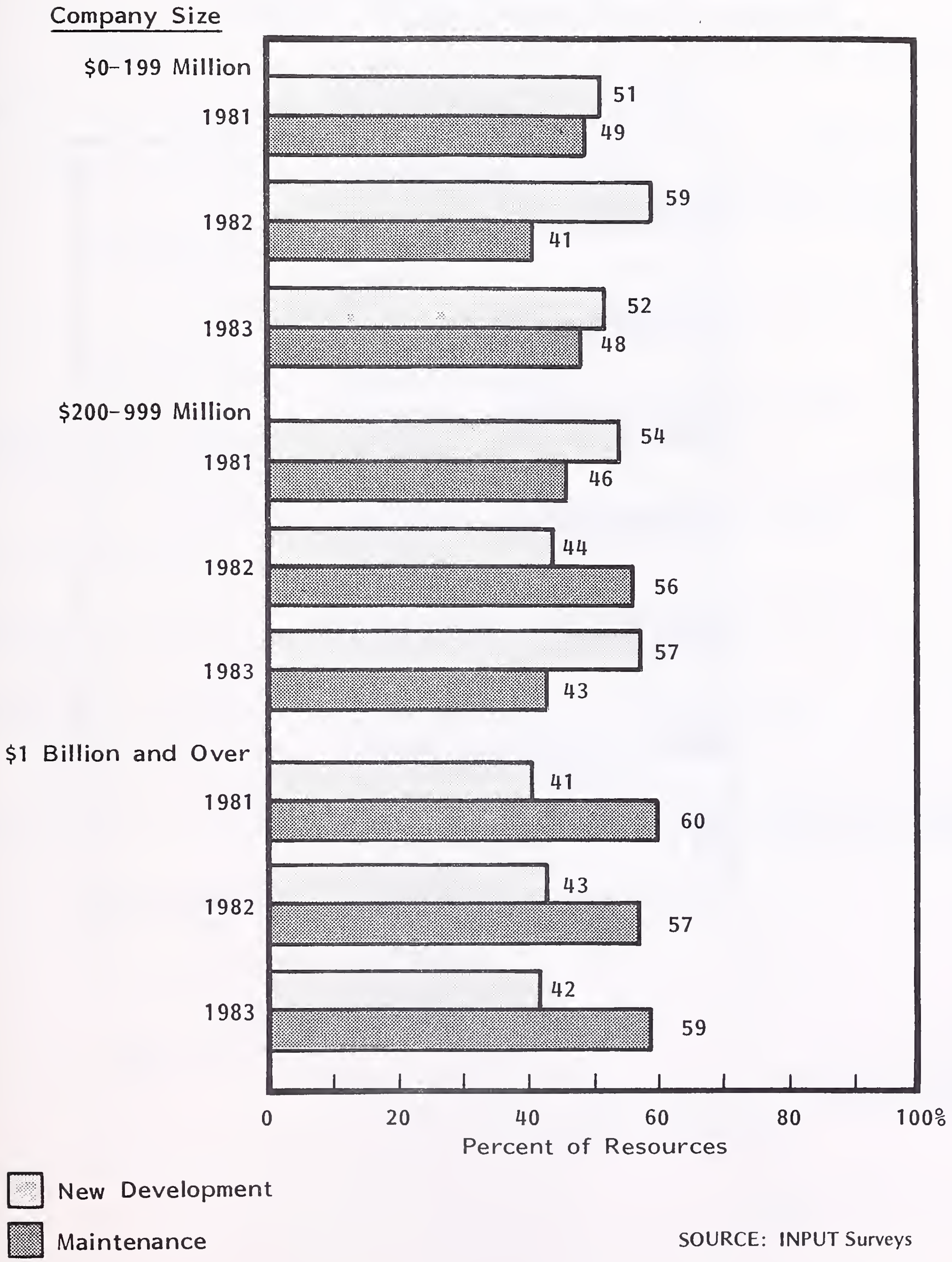
NEW PROGRAM DEVELOPMENT VERSUS MAINTENANCE IN THE PROCESS MANUFACTURING SECTOR, 1981-1983



SOURCE: INPUT Surveys

EXHIBIT III-32

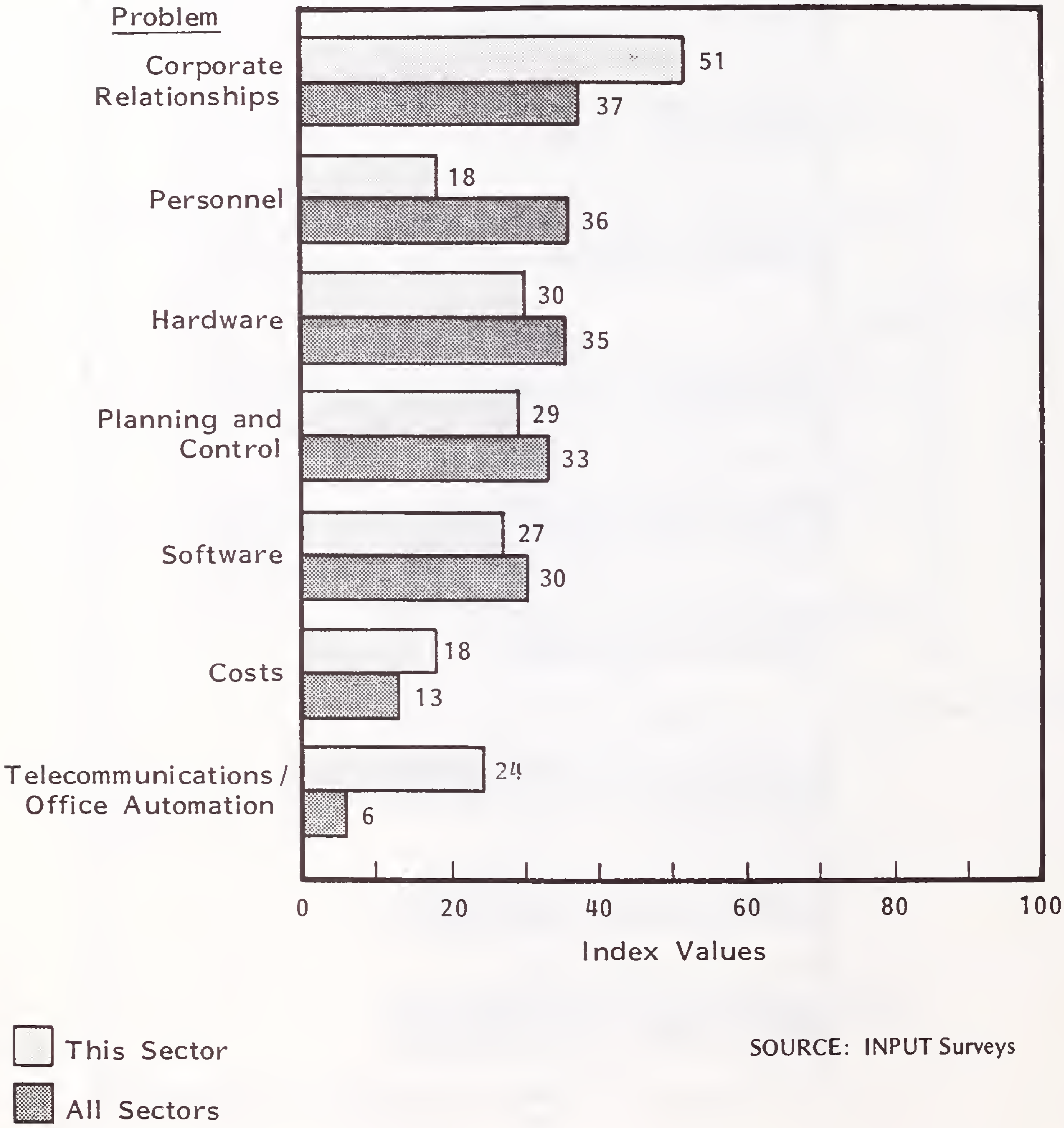
NEW PROGRAM DEVELOPMENT VERSUS MAINTENANCE IN THE PROCESS MANUFACTURING SECTOR, 1981-1983



SOURCE: INPUT Surveys

EXHIBIT III-33

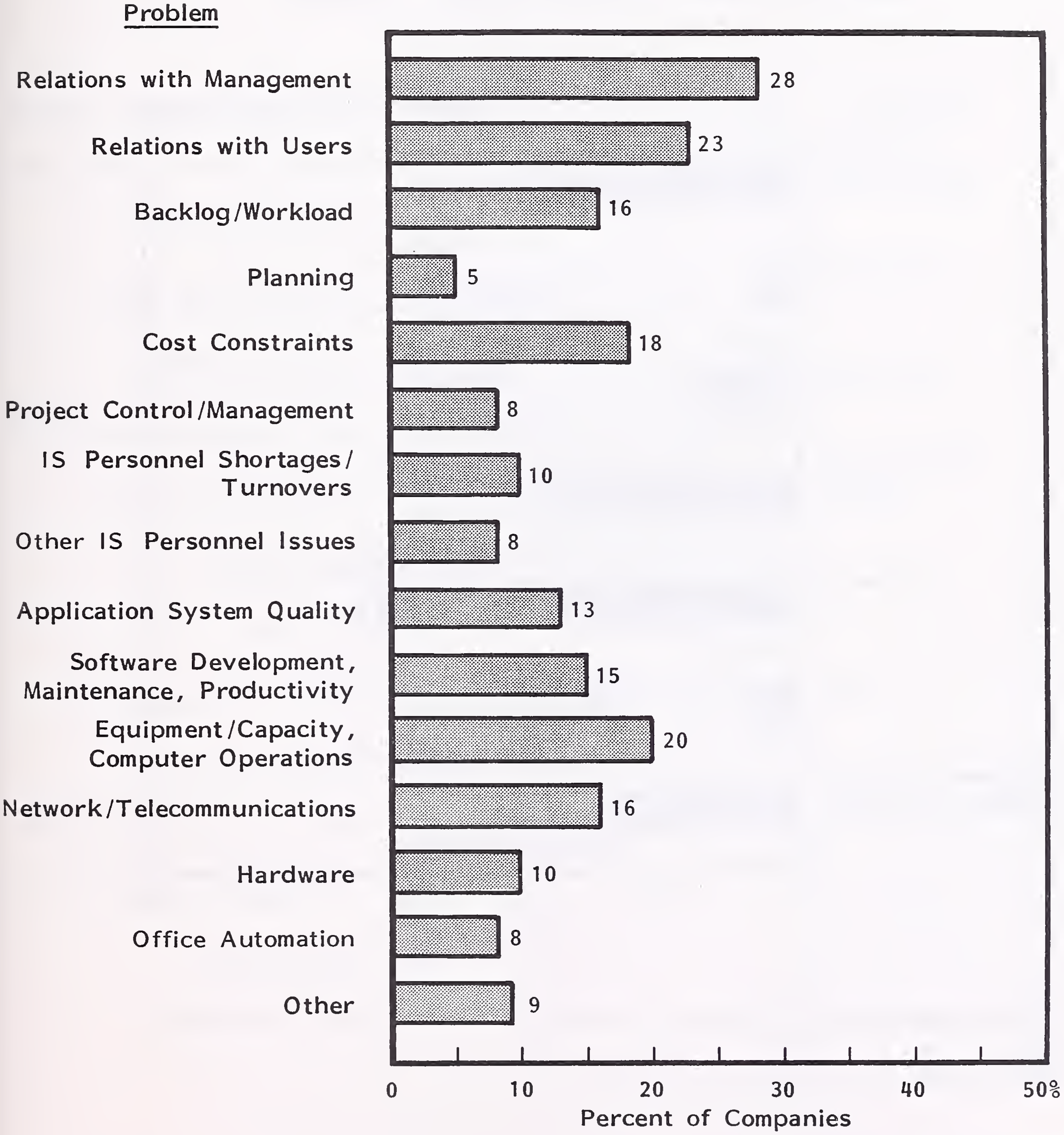
INFORMATION SYSTEMS PROBLEMS IN THE PROCESS MANUFACTURING SECTOR: SUMMARY



SOURCE: INPUT Surveys

EXHIBIT III-34

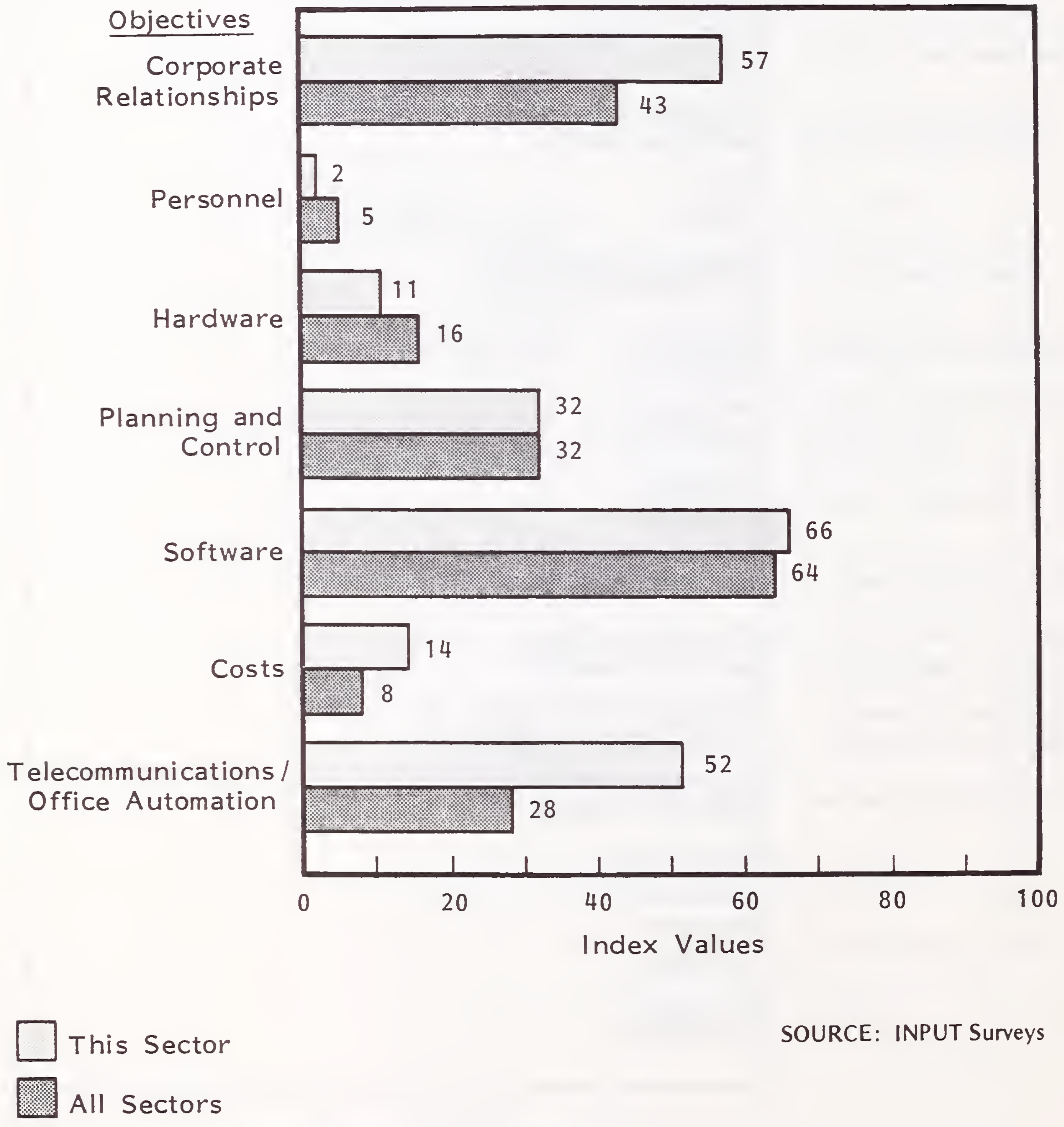
INFORMATION SYSTEMS PROBLEMS IN THE PROCESS MANUFACTURING SECTOR: DETAIL



SOURCE: INPUT Surveys

EXHIBIT III-35

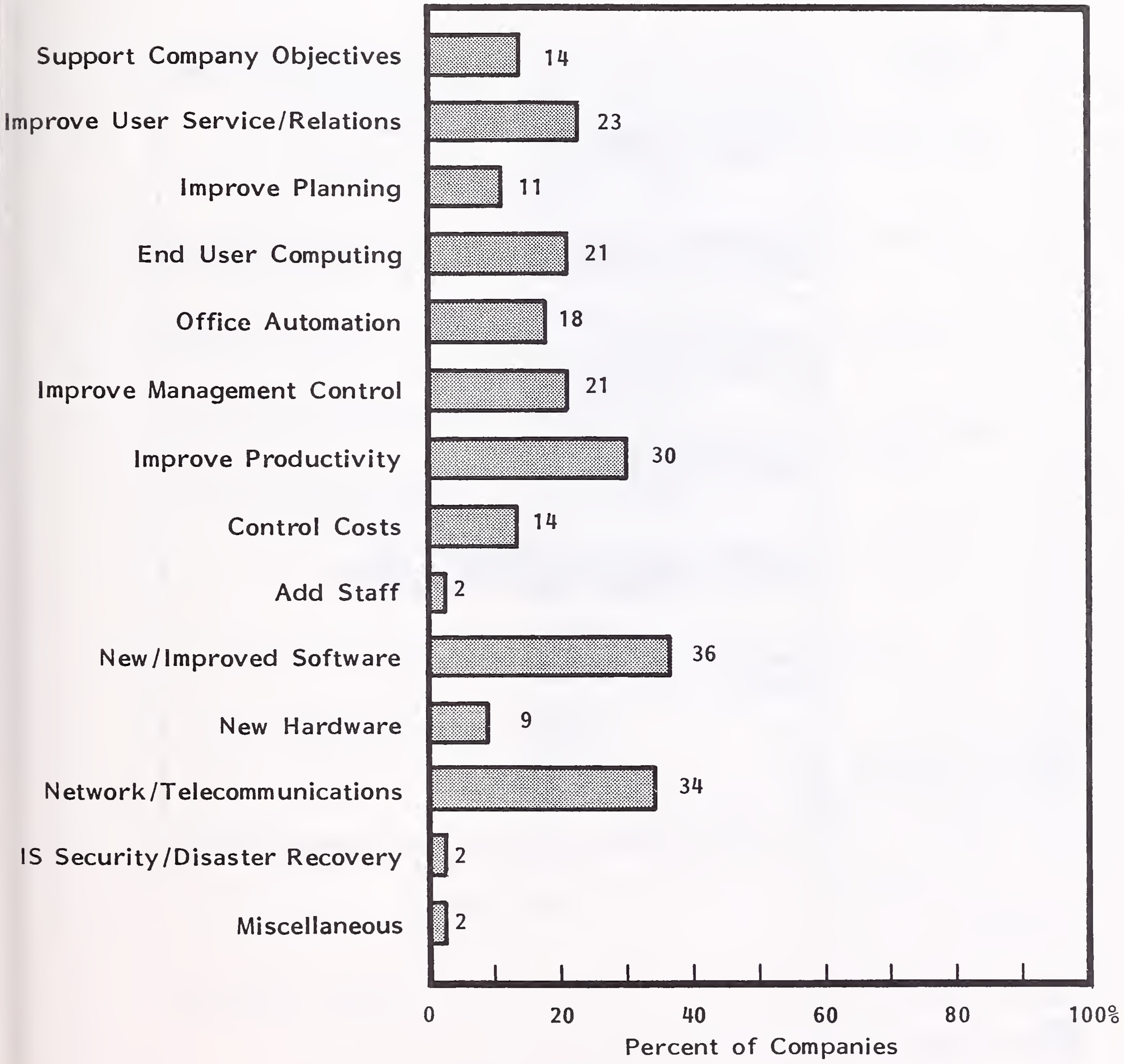
INFORMATION SYSTEMS OBJECTIVES IN THE PROCESS MANUFACTURING SECTOR: SUMMARY



SOURCE: INPUT Surveys

EXHIBIT III-36

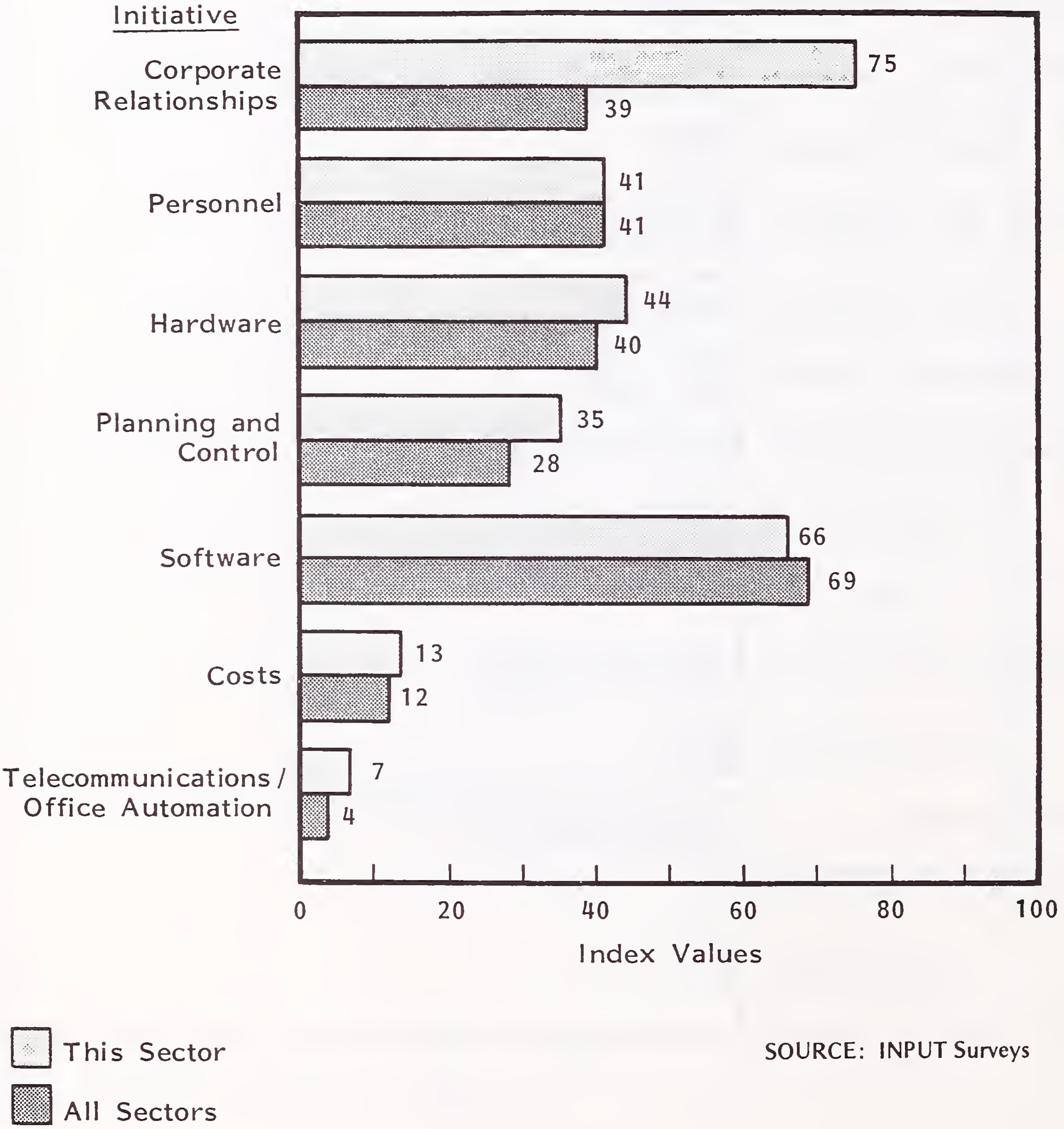
INFORMATION SYSTEMS PLANNING OBJECTIVES IN THE PROCESS MANUFACTURING SECTOR: DETAIL



SOURCE: INPUT Surveys

EXHIBIT III-37

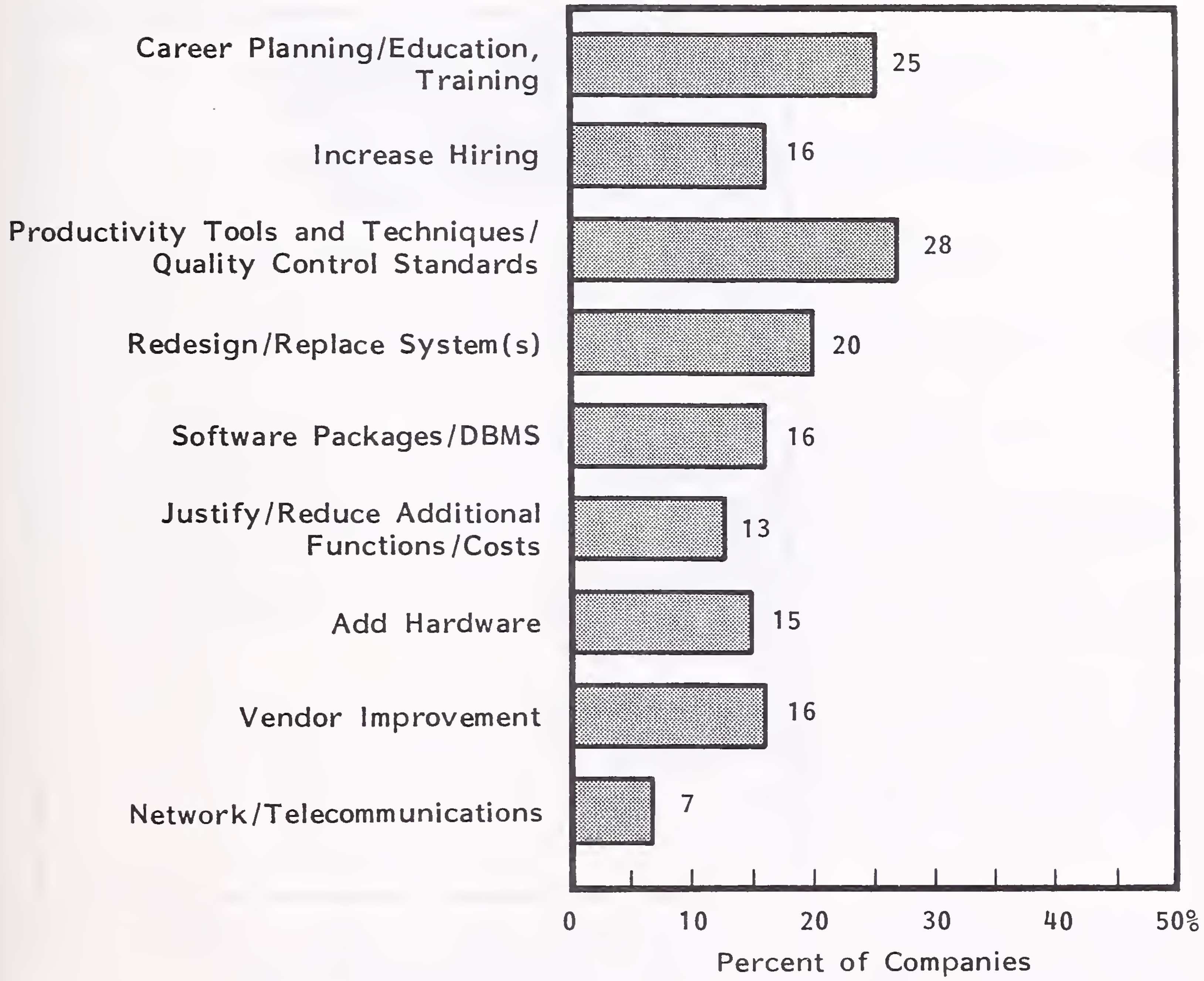
INFORMATION SYSTEMS INITIATIVES IN THE PROCESS MANUFACTURING SECTOR: SUMMARY



SOURCE: INPUT Surveys

EXHIBIT III-38

INITIATIVES PLANNED IN THE PROCESS MANUFACTURING SECTOR: DETAIL

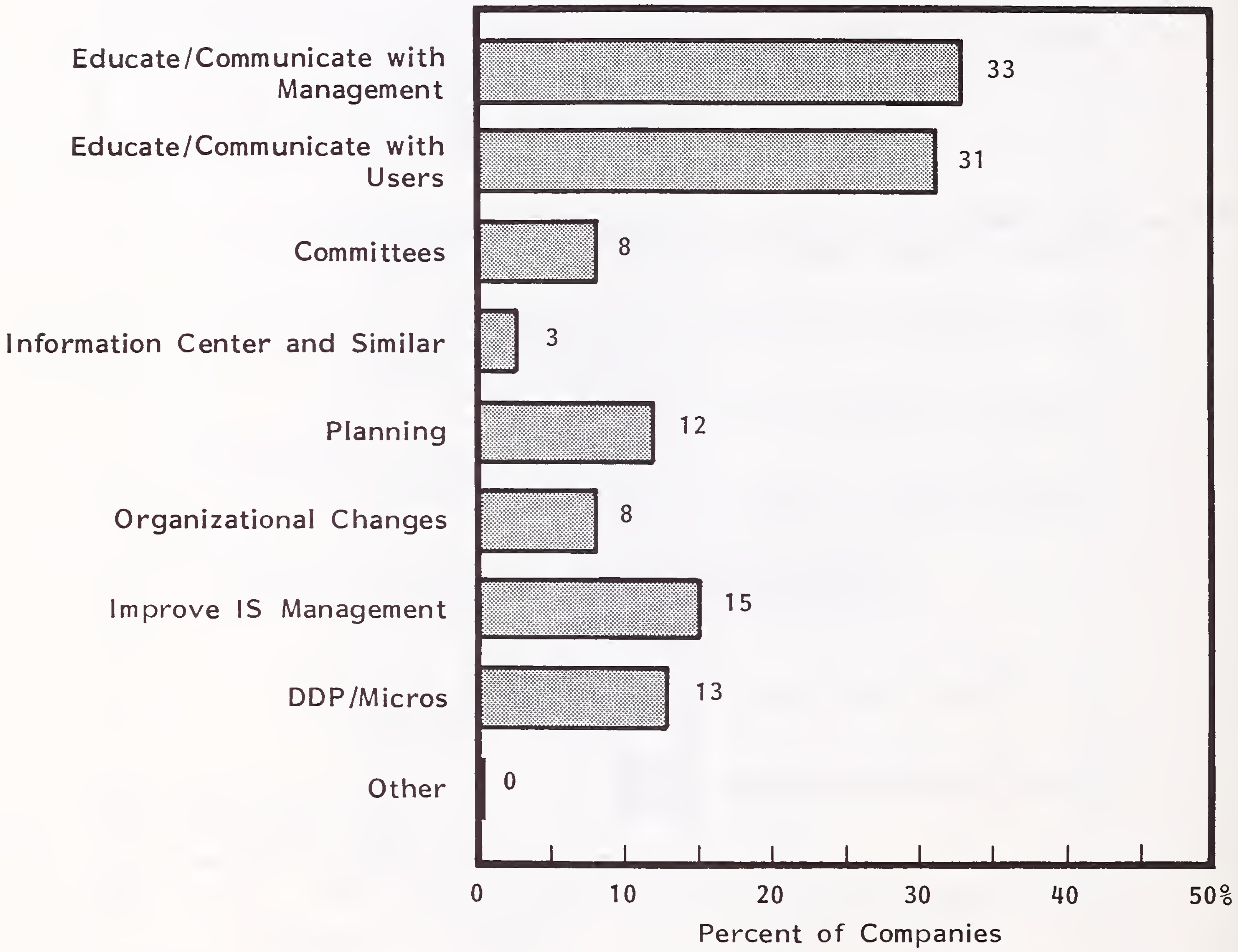


Continued

SOURCE: INPUT Surveys

EXHIBIT III-38 (Cont.)

INITIATIVES PLANNED IN THE PROCESS MANUFACTURING SECTOR: DETAIL



SOURCE: INPUT Surveys

3. INFORMATION SYSTEMS ISSUES

- Note: please refer to Chapter II, Section D for a general discussion of IS problems, objectives, and initiatives and their interrelationships.

- The process manufacturing sector in general sees itself with fewer problems than average, as shown in Exhibit III-33.

  - Only in corporate relationships and telecommunications/office automation are this sector's problems above average in intensity.

  - More detailed information about specific problem areas is contained in Exhibit II-34. This exhibit shows the percentage of companies in this sector which regard an issue as a major problem.

- The objectives profile mirrors the problems profile in that the objectives receiving more priority than average are those which are perceived to be significant problems for the industry's companies, as shown in Exhibit III-35. Otherwise, the process industry's objectives profile is similar to the all-industry profile.

  - More detailed information about specific planning objectives is contained in Exhibit III-36. This exhibit shows the percentage of companies in this sector which have identified particular planning objectives as being of major importance.

- Much more stress is being placed by this sector on initiatives involving corporate relationships than is true for most other sectors, as shown in Exhibit III-37.

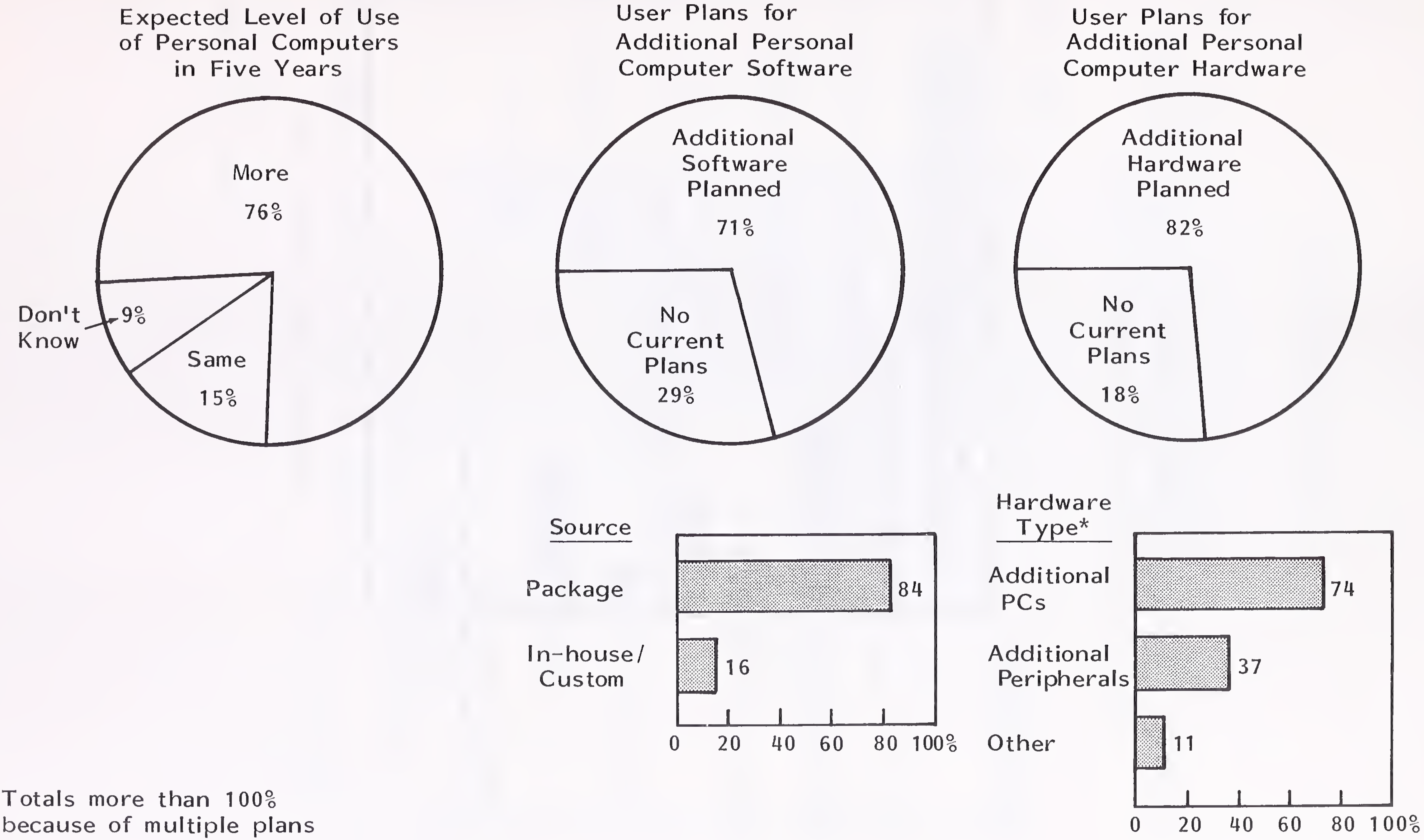
  - More detailed information about specific areas where an initiative is planned is contained in Exhibit III-38. this exhbit shows the percentage of companies in this sector planning a major initiative in a particular area.

4. PERSONAL COMPUTERS

- Plans for the use of personal computers in the process manufacturing sector are shown in Exhibit III-39 and include:
  - The overall level of use in five years.
  - Plans for obtaining additional personal computer software.
  - Plans for obtaining additional personal computer hardware.
- This sector plans considerably more hardware and software acquisitions than the typical sector.
- Exhibit III-40 shows the types of personal computer software packages now used.
  - More packages of practically every kind are used, compared to the industry average.
- The general categories of applications used are summarized in Exhibit III-41. The application profile is generally similar to the all-industry average.
  - Exhibit III-42 provides examples of actual personal computer applications in use in the process manufacturing sector.
- Compared to the average user, personal computer users in this sector are about as likely to rely on the IS department for assistance, as shown in Exhibit III-43. Vendors and books are the most likely to be utilized by this group.

EXHIBIT III-39

PERSONAL COMPUTER ACQUISITION PLANS IN THE PROCESS MANUFACTURING SECTOR

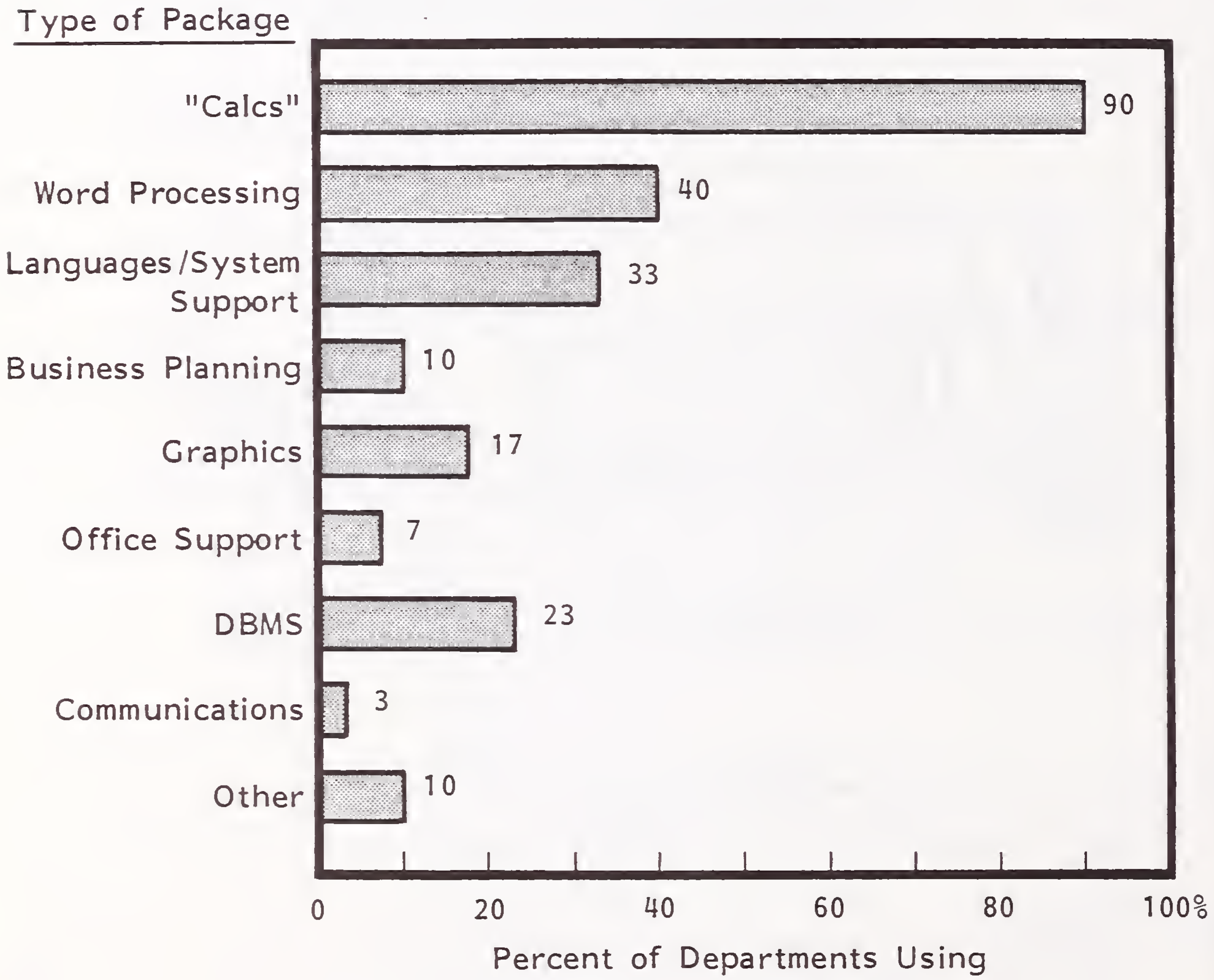


*Totals more than 100% because of multiple plans

SOURCE: INPUT Surveys

EXHIBIT III-40

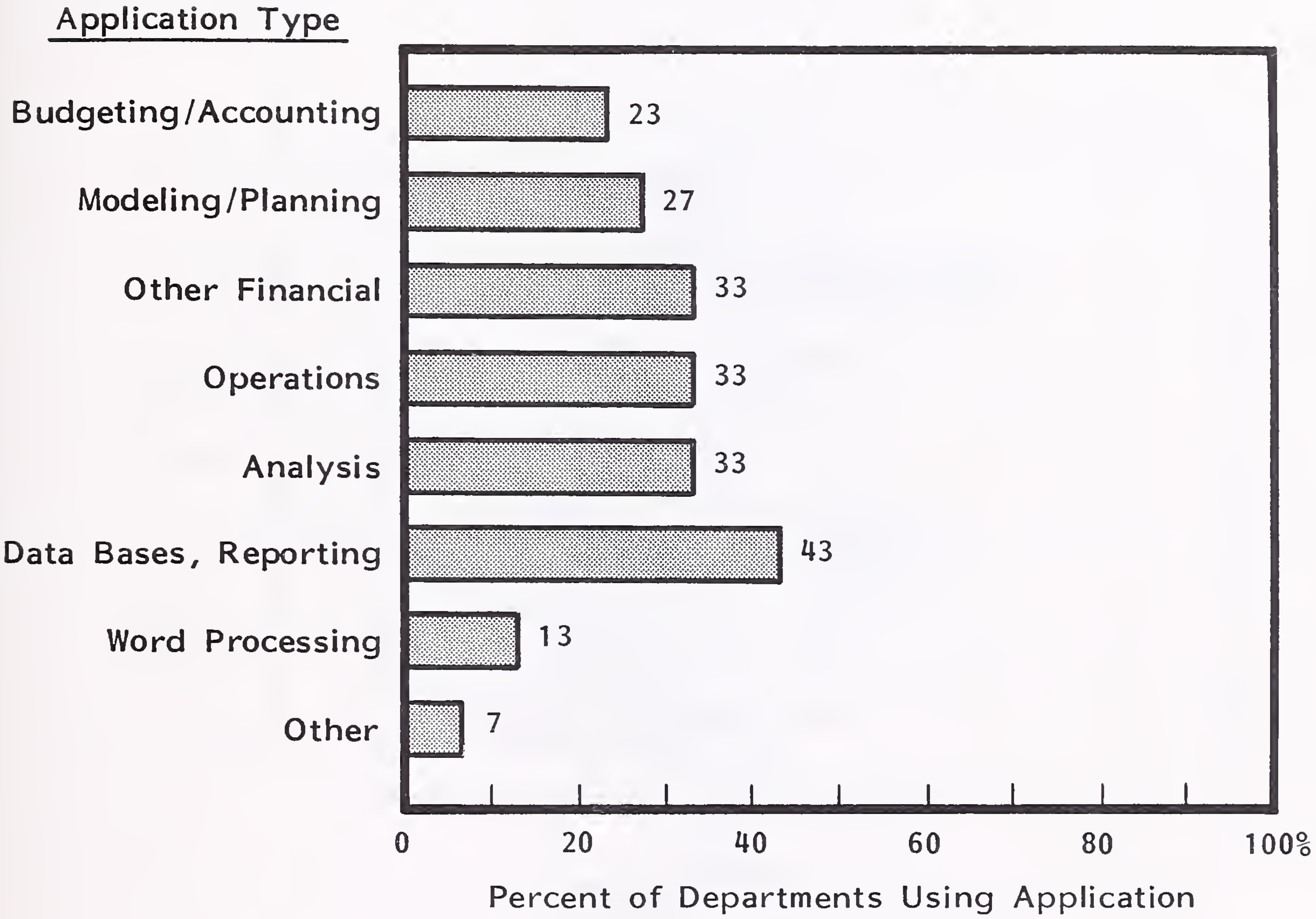
TYPES OF PERSONAL COMPUTER SOFTWARE PACKAGES USED BY THE PROCESS MANUFACTURING SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-41

PERSONAL COMPUTER APPLICATIONS IN THE PROCESS MANUFACTURING SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-42

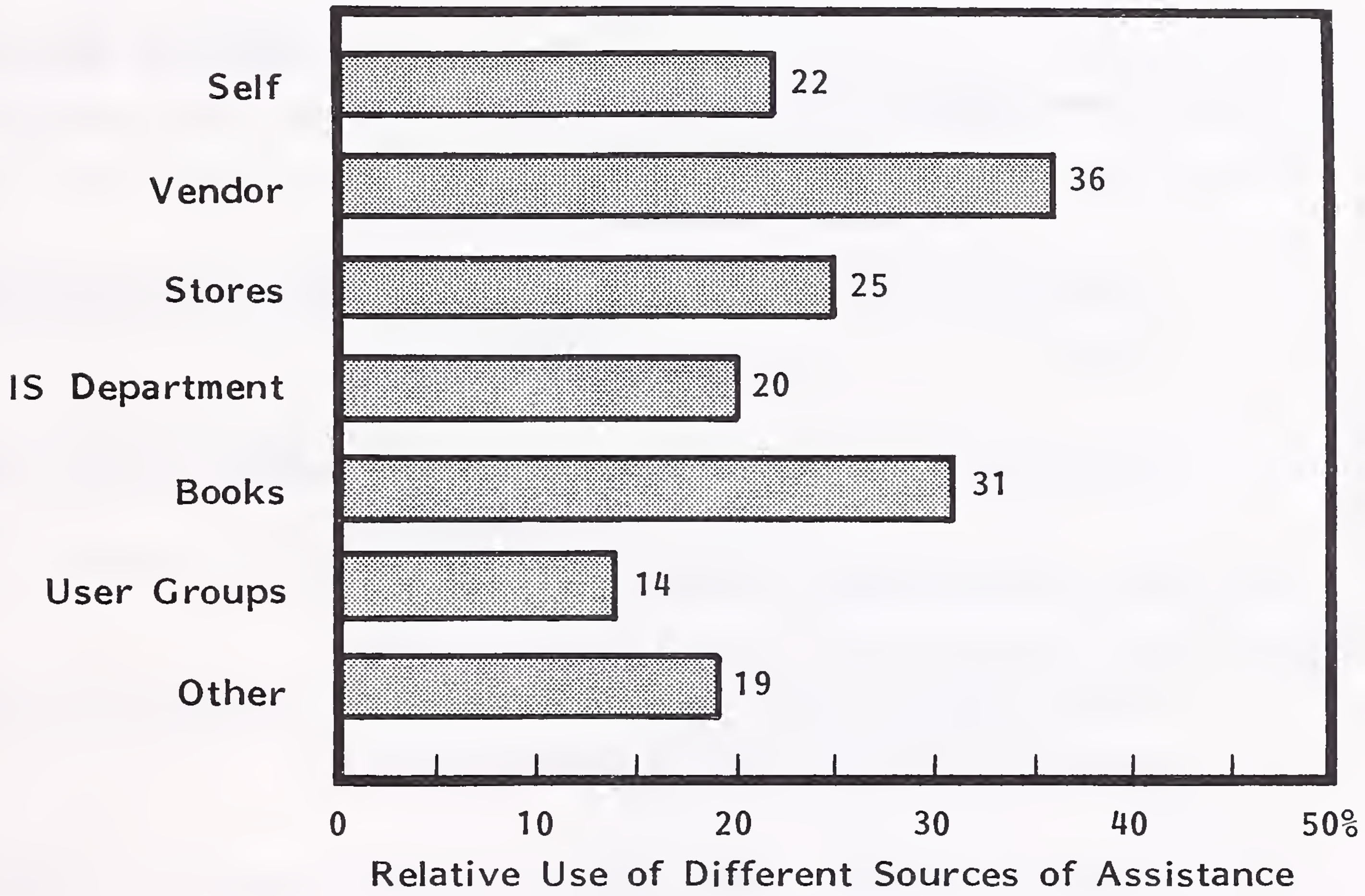
PERSONAL COMPUTER APPLICATIONS IN THE PROCESS MANUFACTURING SECTOR

Word Processing
DBMS
Financial Modeling
Research
Forecasts
Profit Planning and Analysis
Budgets
Engineering Analysis
Spread Sheets
Contract Writing
File Manipulation
Inventory Control
Process Control
Research and Development
On-line Acquisition
Program Development
Manufacturing
General Ledger
Plotting
Charts
Scheduling
VisiCalc Constructions
Corporate Relocation Files
Consolidation
Corporate Planning
Shipping Scheduling
Run Regressions
Pressure Calculations
Bill of Materials
Calculation of Bills

SOURCE: INPUT Surveys

EXHIBIT III-43

SOURCES OF ASSISTANCE FOR PERSONAL COMPUTER USERS IN THE PROCESS MANUFACTURING SECTOR



Note: Total Is More Than 100% Because of Multiple Sources.

SOURCE: INPUT Surveys

- In this sector 76% of departments using personal computers have had their installation less than a year, as shown in Exhibit III-44, compared to 78% generally.

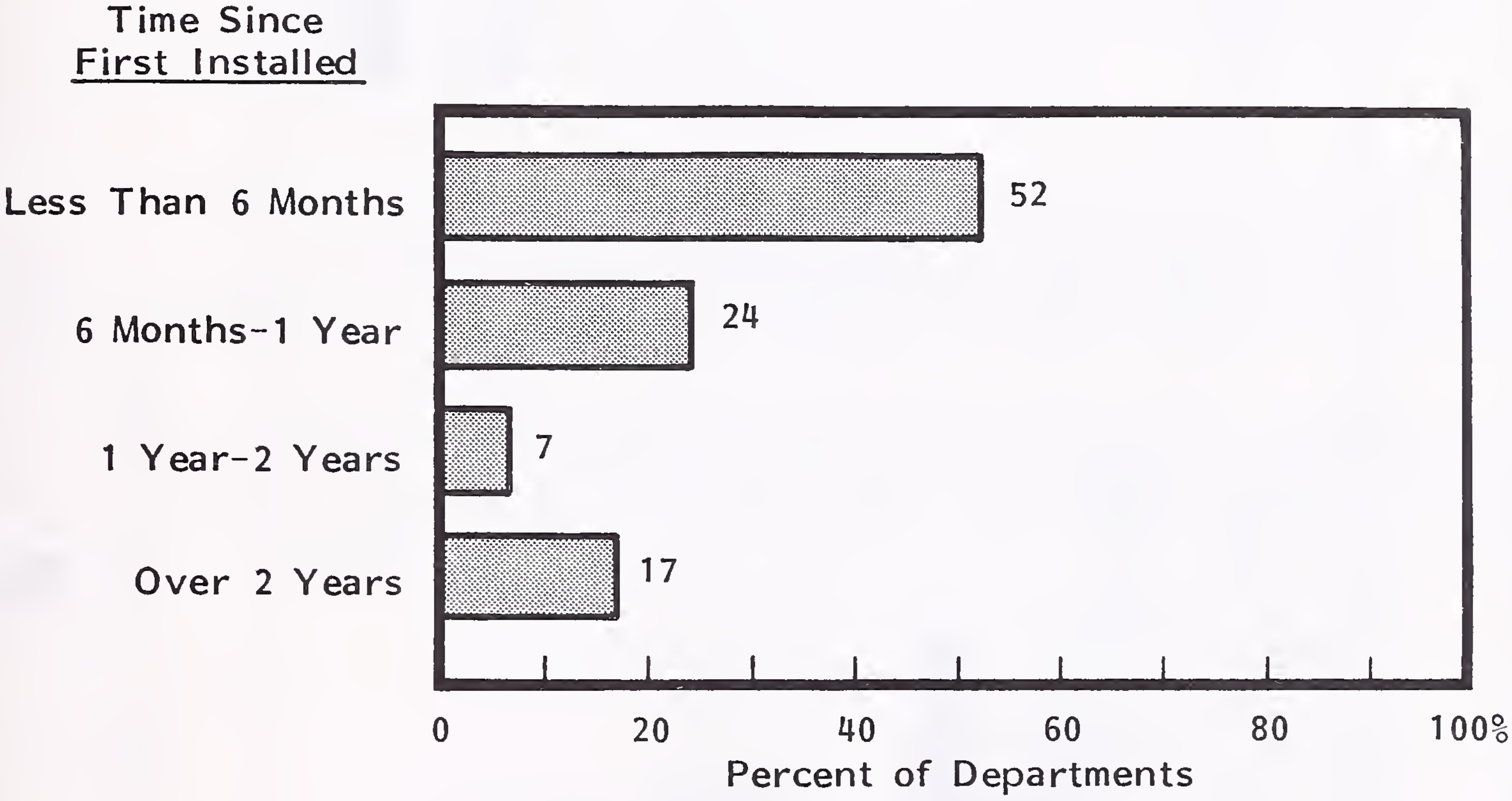
D. TRANSPORTATION SECTOR

1. BUDGETS

- In this sector 64% of the companies expect budget increases in 1983, compared to 61% generally; 7% expect a decrease compared to 8% generally, as shown in Exhibit III-45.
    - Companies expecting to increase their budgets foresee an average rise of 20%.
    - Companies anticipating decreases expect their budgets to drop by 20%.
- The budget increases expected vary by company size.
    - Large companies: 50% expect increases in the transportation sector, compared to 63% for large companies generally.
    - Medium companies: 60% expect increases, compared to 63% for medium companies generally.
    - Small companies: 80% expect increases, compared to 57% for small companies generally.
- The average budget growth expected for 1983 in the transportation sector is 12%, compared to 9% in 1982.

EXHIBIT III-44

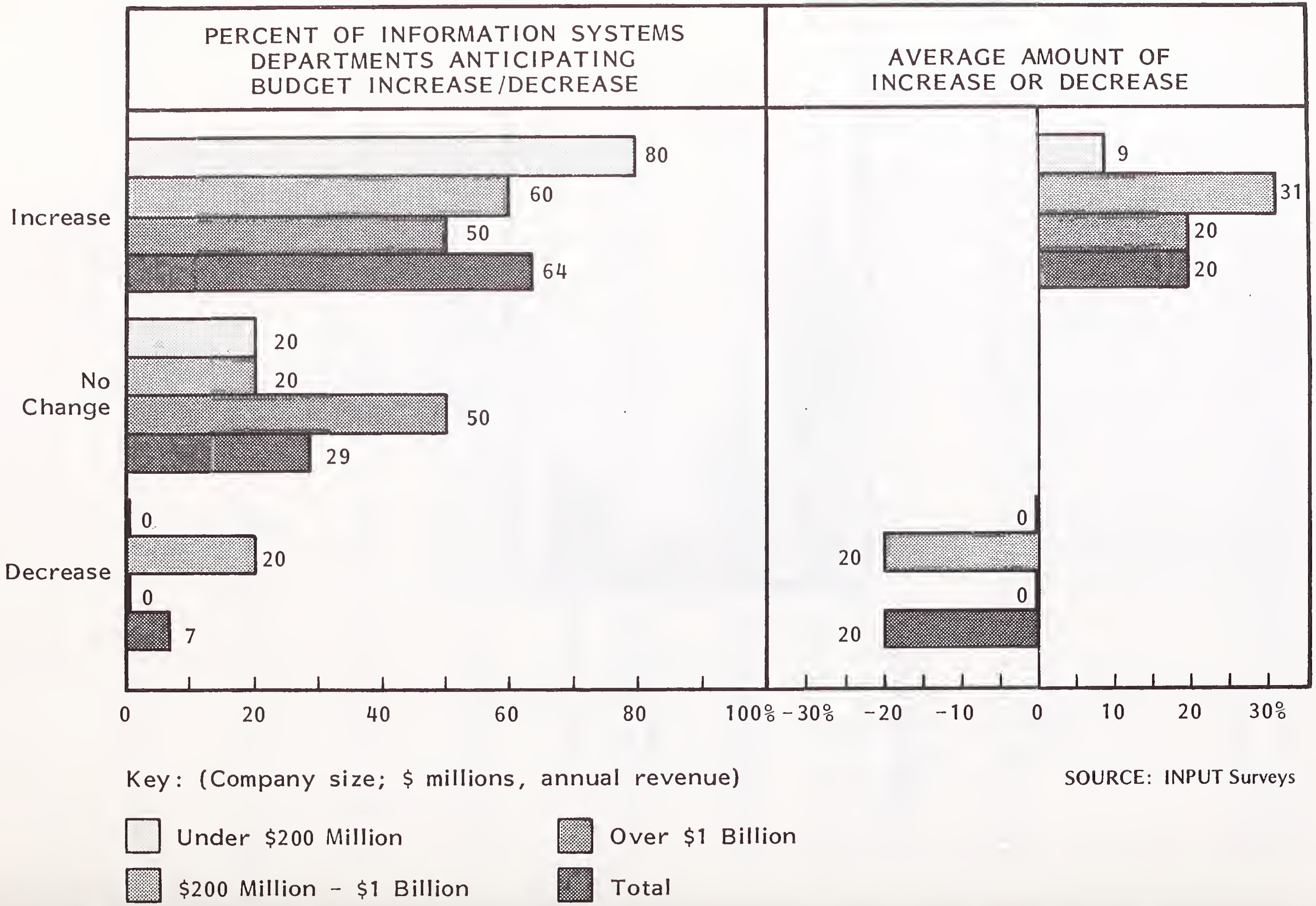
TIME SINCE FIRST PERSONAL COMPUTER INSTALLED IN USER DEPARTMENTS IN THE PROCESS MANUFACTURING SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-45

ANTICIPATED BUDGET INCREASES FOR 1983 IN TRANSPORTATION



SOURCE: INPUT Surveys

  - This represents an increase of 34% in the rate of growth.

- The 1982 IS budget distribution is shown in Exhibit III-46.

  - The largest changes are expected in communications and software.

- Exhibit III-47 shows the range of the ratios between the IS budget and the company's total revenues which exist in the transportation sector.

  - The IS percentage of total revenues for the average company (i.e., for 50% of respondents) in each size group was:

    - For large and medium companies: 0.2%, compared to about 7% for this size company generally. (Note: Due to sample sizing, large and medium companies have been combined for analysis.)

  - The companies that spend least on data processing as a percentage of revenues are those at and below the 20% mark. Their IS spending percentages were:

    - Large and medium companies: 0.1%.

    - Small companies: 0.1%.

  - The companies that spend the most on data processing as a percentage of revenues are those at and above the 80% mark. Their IS spending percentages were:

    - Large and medium companies: 0.4%.

    - Small companies: 1.8%.

EXHIBIT III-46

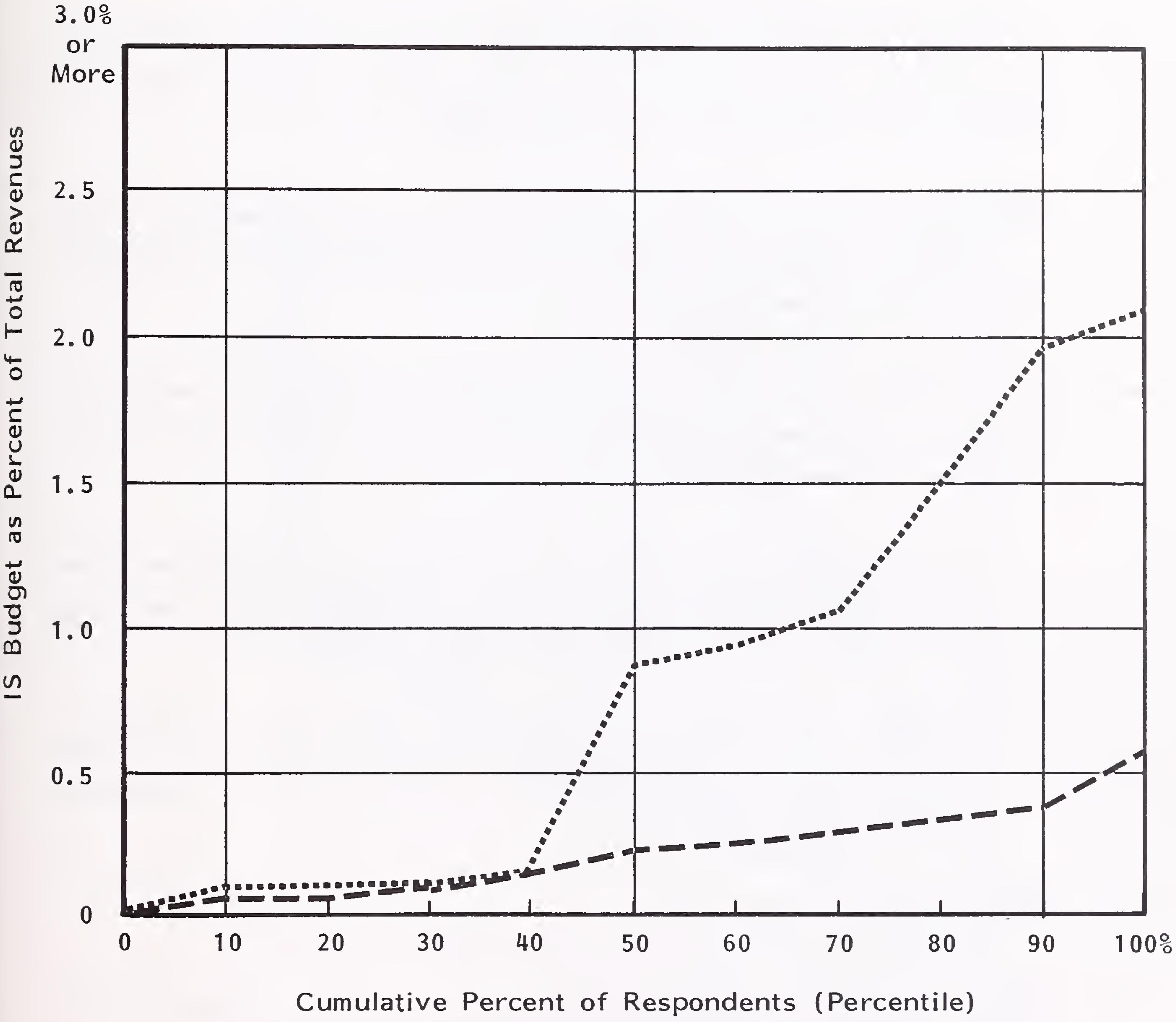
1982 BUDGET DISTRIBUTION AND 1982/1983 CHANGES IN THE TRANSPORTATION SECTOR

BUDGET CATEGORY	PERCENT OF IS BUDGET (1982)	EXPECTED CHANGE 1982 to 1983
Personnel	42%	11%
Hardware		
Mainframe	15	9
Mini/Microcomputer	1	8
Terminals	5	6
Peripherals	7	3
Communications	6	17
Software and Services		
Software	5	38
Processing Services	<1	-
Software Maintenance	3	6
Hardware Maintenance	7	7
Other	9	10
Total	100%	12%

SOURCE: INPUT Surveys

EXHIBIT III-47

INFORMATION SYSTEMS BUDGET AS A PERCENT OF TOTAL REVENUES IN THE TRANSPORTATION SECTOR



Key - Company Size:

•••••••••••• $0 - $199 million

— — — — $200 million and over

SOURCE: INPUT Surveys

2. STAFFING

- Median spending on IS per corporate employee was $590. However, there was a broad range of spending ratios as shown in the diagram in Exhibit III-48.
    - The reasons for this variation were discussed in Chapter II, Section B.

- Turnover in this sector is expected to be about 90% of the all-industry average in 1983, as shown in Exhibit II-9. Current turnover rates for individual positions are not shown due to insufficient data.

- Difficulty in recruiting staff in this sector was seen to be less than average and, except for technical specialists, was not generally seen as a major problem, as shown in Exhibit III-49.

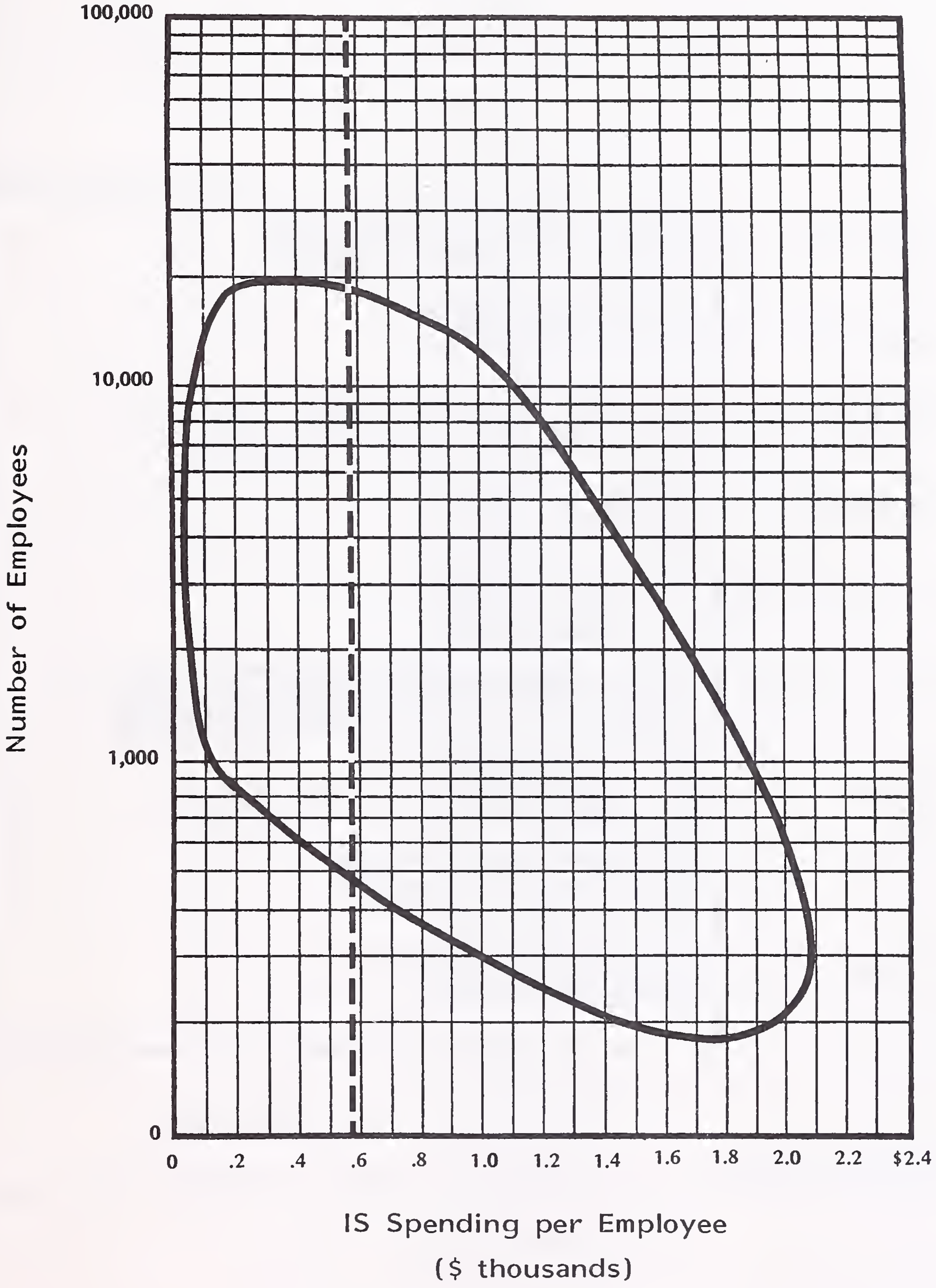
- The number of programs to be maintained averages 800 in this sector, although the range, both in absolute numbers and based on company size, is quite broad, as shown in Exhibit III-50.
    - Maintenance, as a proportion of total workload, is about 40% and is not expected to change appreciably. New development is more important in this sector than in most others, as shown in Exhibit III-51.
    - Company size does have an impact on the proportion of maintenance, with the largest companies having the greatest maintenance loads, as shown in Exhibit III-52.

3. INFORMATION SYSTEMS ISSUES

- Note: please refer to Chapter II, Section D for a general discussion of IS problems, objectives, and initiatives and their interrelationships.

EXHIBIT III-48

INFORMATION SYSTEMS SPENDING PER EMPLOYEE, BY COMPANY SIZE IN THE TRANSPORTATION SECTOR

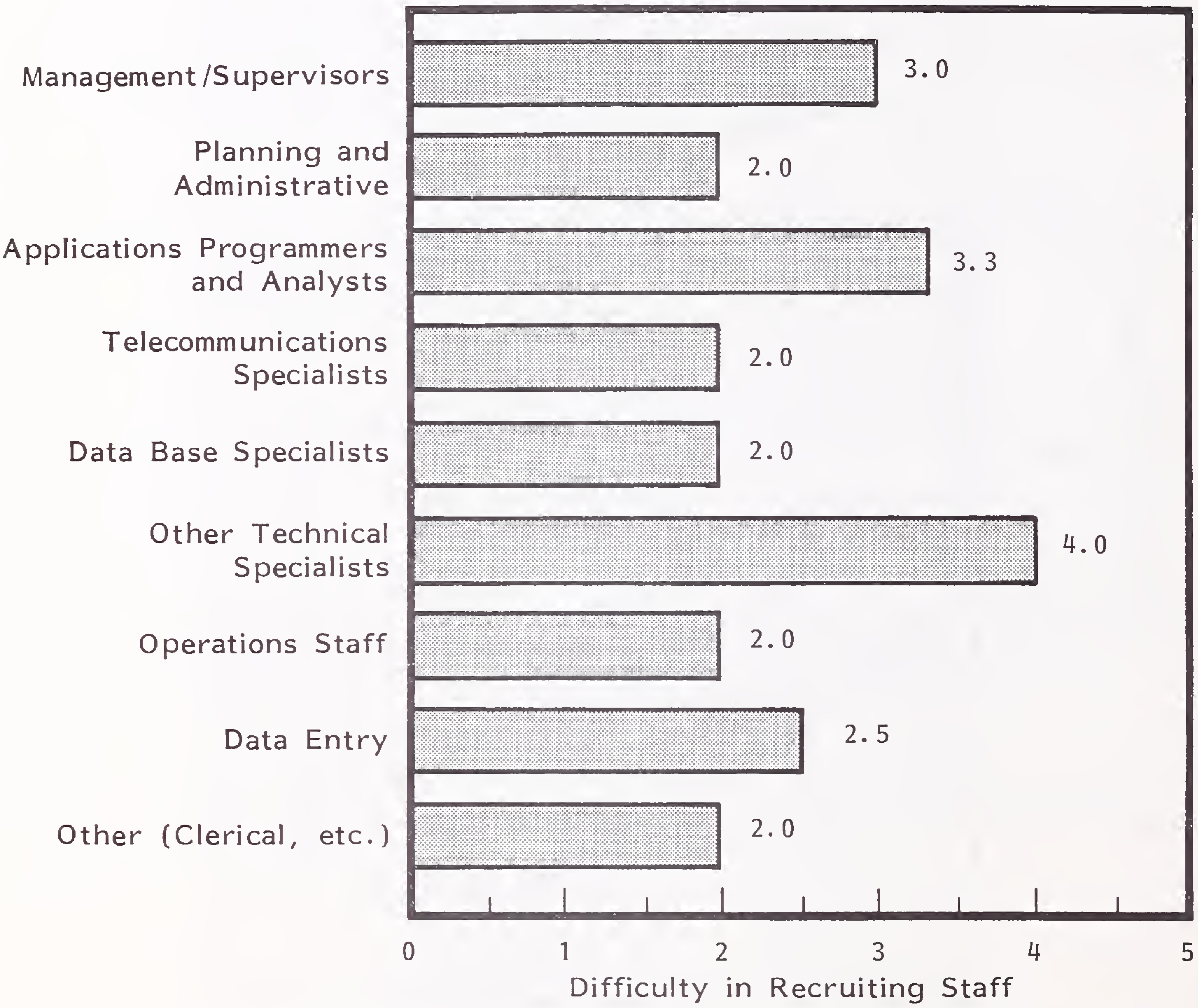


▬ ▬ ▬ ▬ = Median

SOURCE: INPUT Surveys

EXHIBIT III-49

INFORMATION SYSTEMS DIFFICULTY IN RECRUITING STAFF IN THE TRANSPORTATION SECTOR

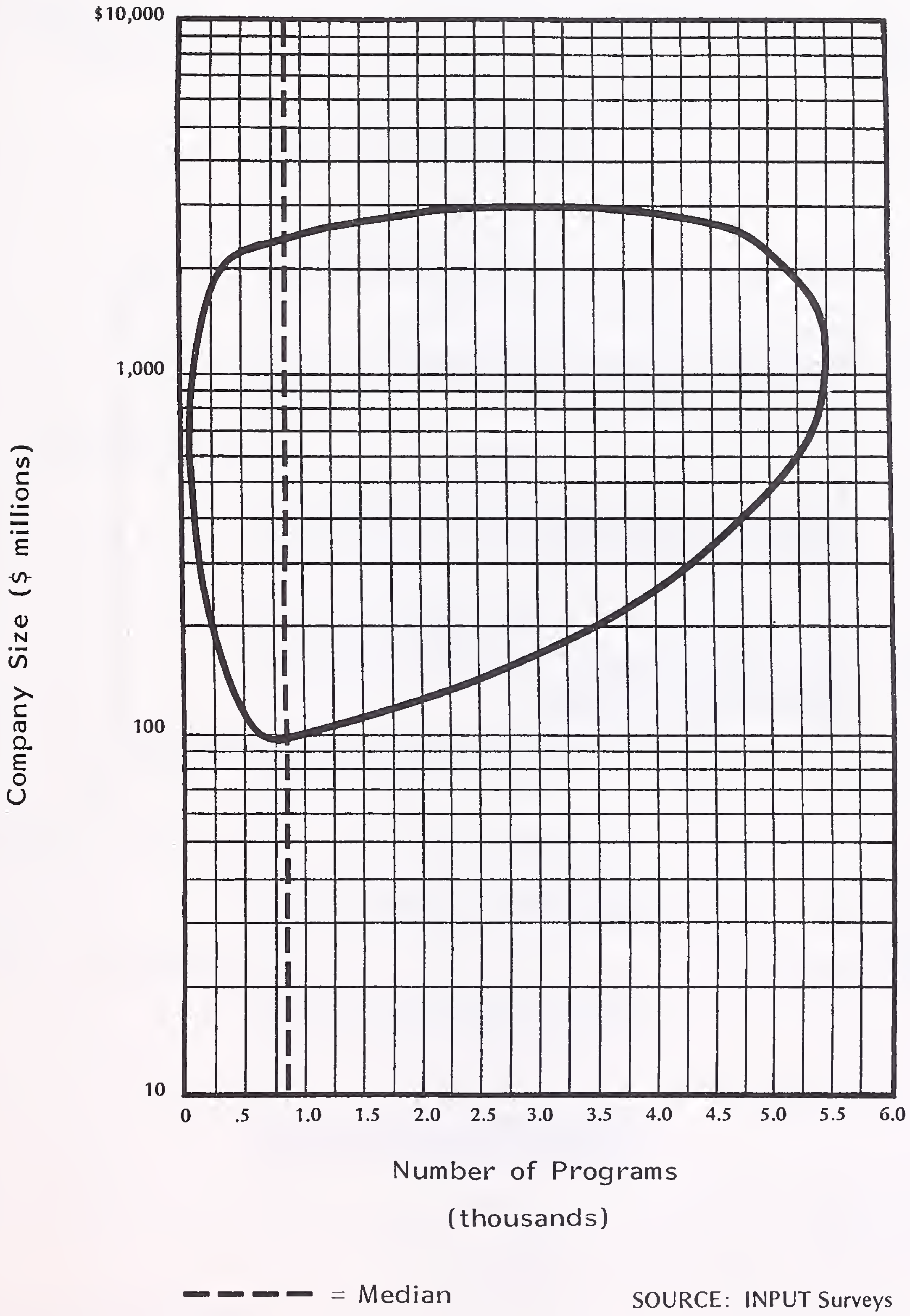


Scale: 1 = Low, 5 = High

SOURCE: INPUT Surveys

EXHIBIT III-50

NUMBER OF PROGRAMS BY COMPANY SIZE IN THE TRANSPORTATION SECTOR

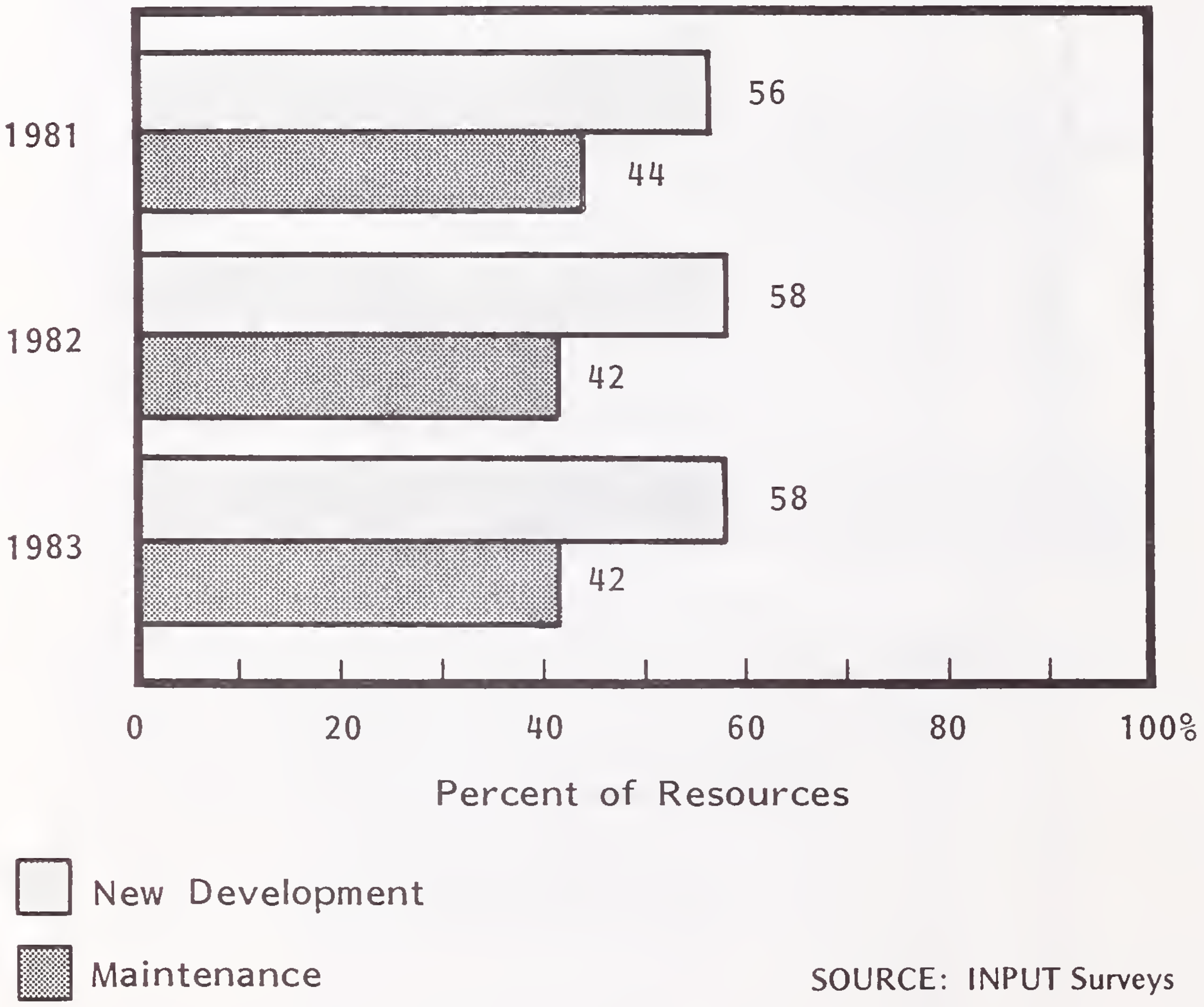


SOURCE: INPUT Surveys

EXHIBIT III-51

NEW PROGRAM DEVELOPMENT VERSUS MAINTENANCE IN THE TRANSPORTATION SECTOR,

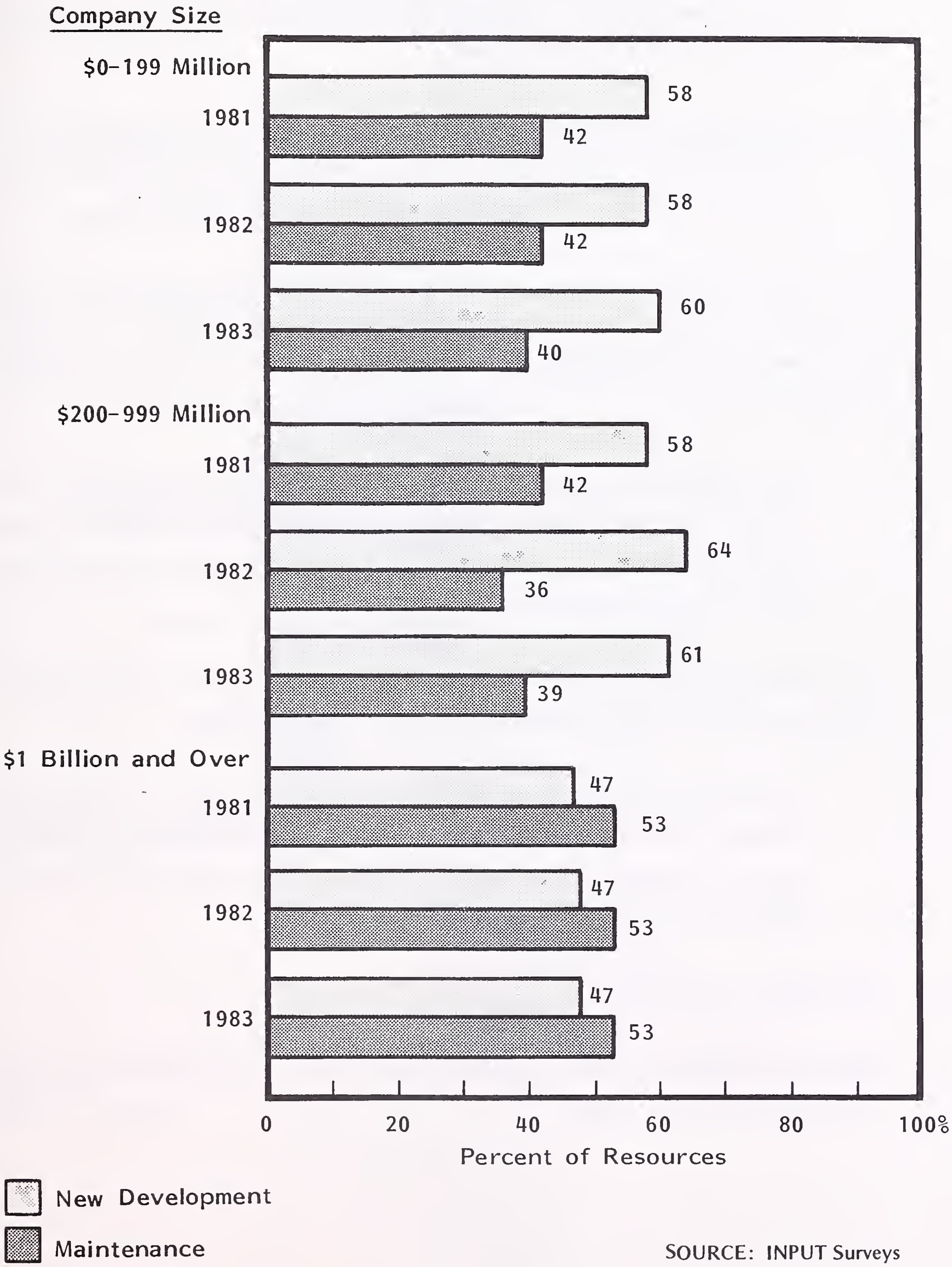
1981-1983



SOURCE: INPUT Surveys

EXHIBIT III-52

NEW PROGRAM DEVELOPMENT VERSUS MAINTENANCE IN THE TRANSPORTATION SECTOR, 1981-1983



SOURCE: INPUT Surveys

- The problem profile for the transportation sector is generally similar to the all-industry average, as shown in Exhibit III-53. In most areas this sector sees itself with fewer problems than average.

  - This sector sees itself as generally having fewer planning and control problems than do most sectors.

  - More detailed information about specific problem areas is contained in Exhibit III-54. This exhibit shows the percentage of companies in this sector which regard an issue as a major problem.

- While seeing itself as having somewhat fewer problems than average, the transportation sector has major objectives far above average in corporate relationships, software, and telecommunications/office automation, as shown in Exhibit III-55.

  - More detailed information about specific planning objectives is contained in Exhibit III-56. This exhibit shows the percentage of companies in this sector which have identified particular planning objectives of major importance.

- The transportation sector does not place greater stress on particular initiative areas than the all-industry average, as shown in Exhibit III-57.

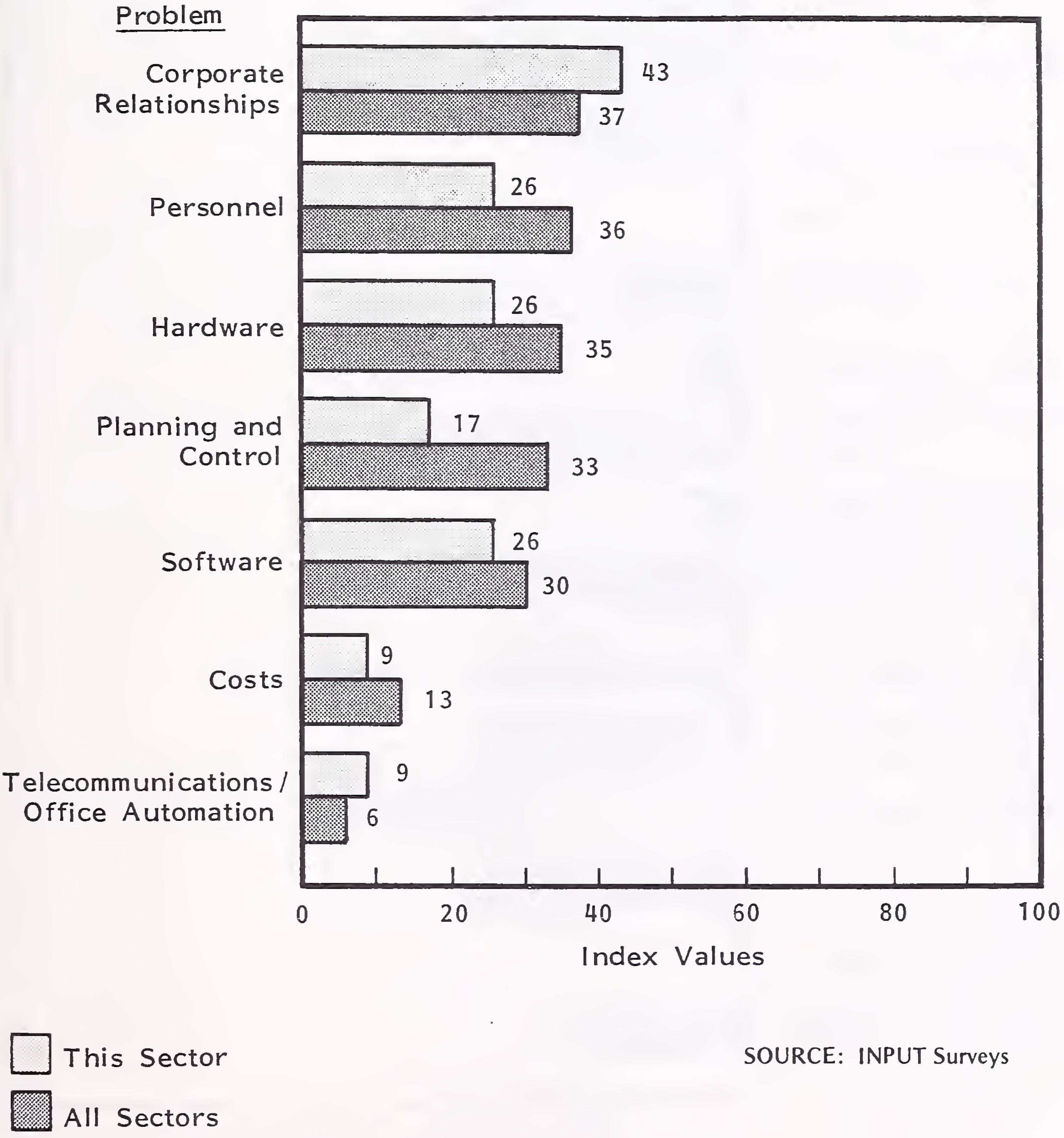
  - More detailed information about specific areas where an initiative is planned is contained in Exhibit III-58. This exhibit shows the percentage of companies in this sector planning a major initiative in a particular area.

4. PERSONAL COMPUTERS

- Plans for the use of personal computers in the transportation sector are shown in Exhibit III-59 and include:

EXHIBIT III-53

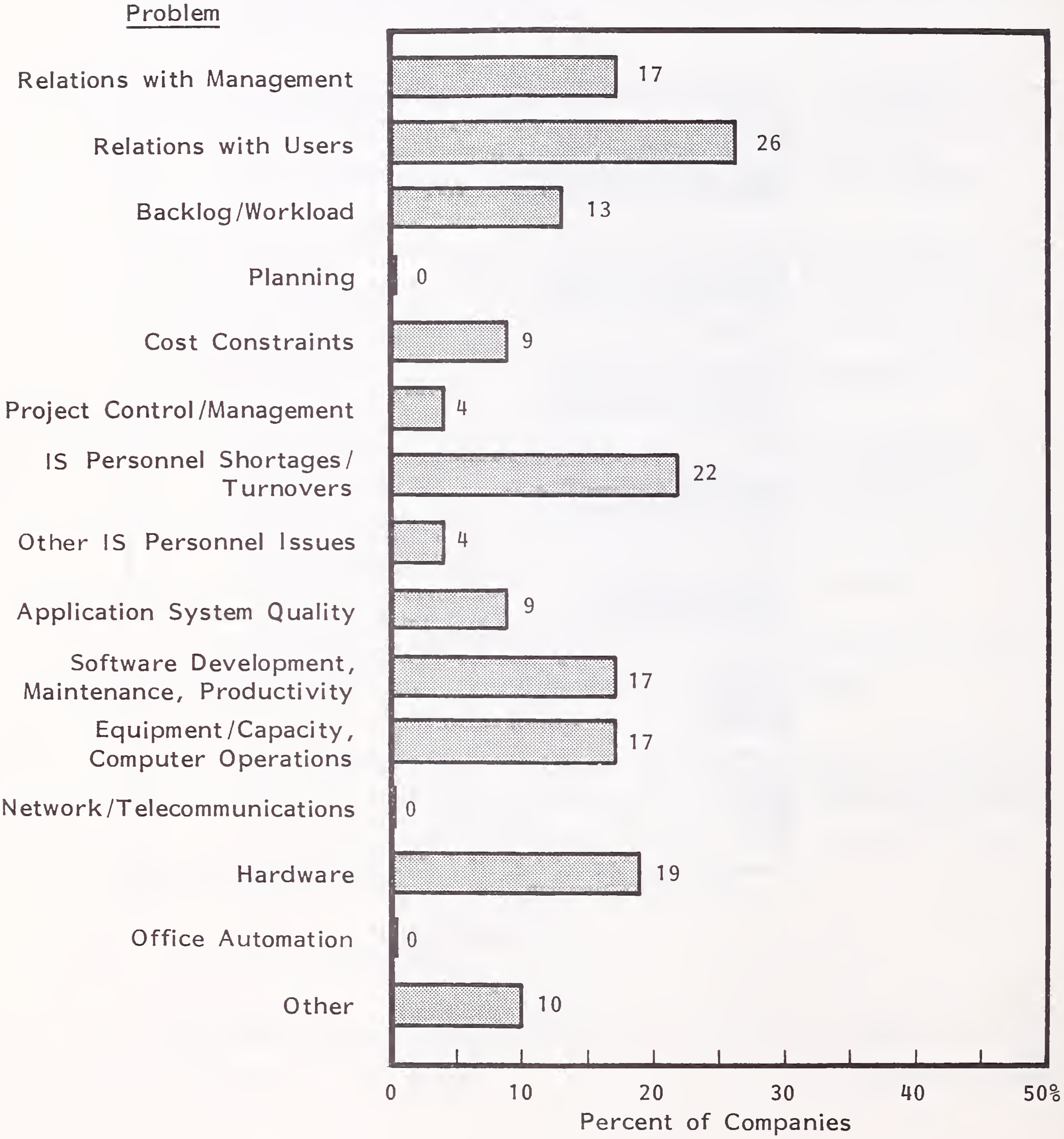
INFORMATION SYSTEMS PROBLEMS IN THE TRANSPORTATION SECTOR: SUMMARY



SOURCE: INPUT Surveys

EXHIBIT III-54

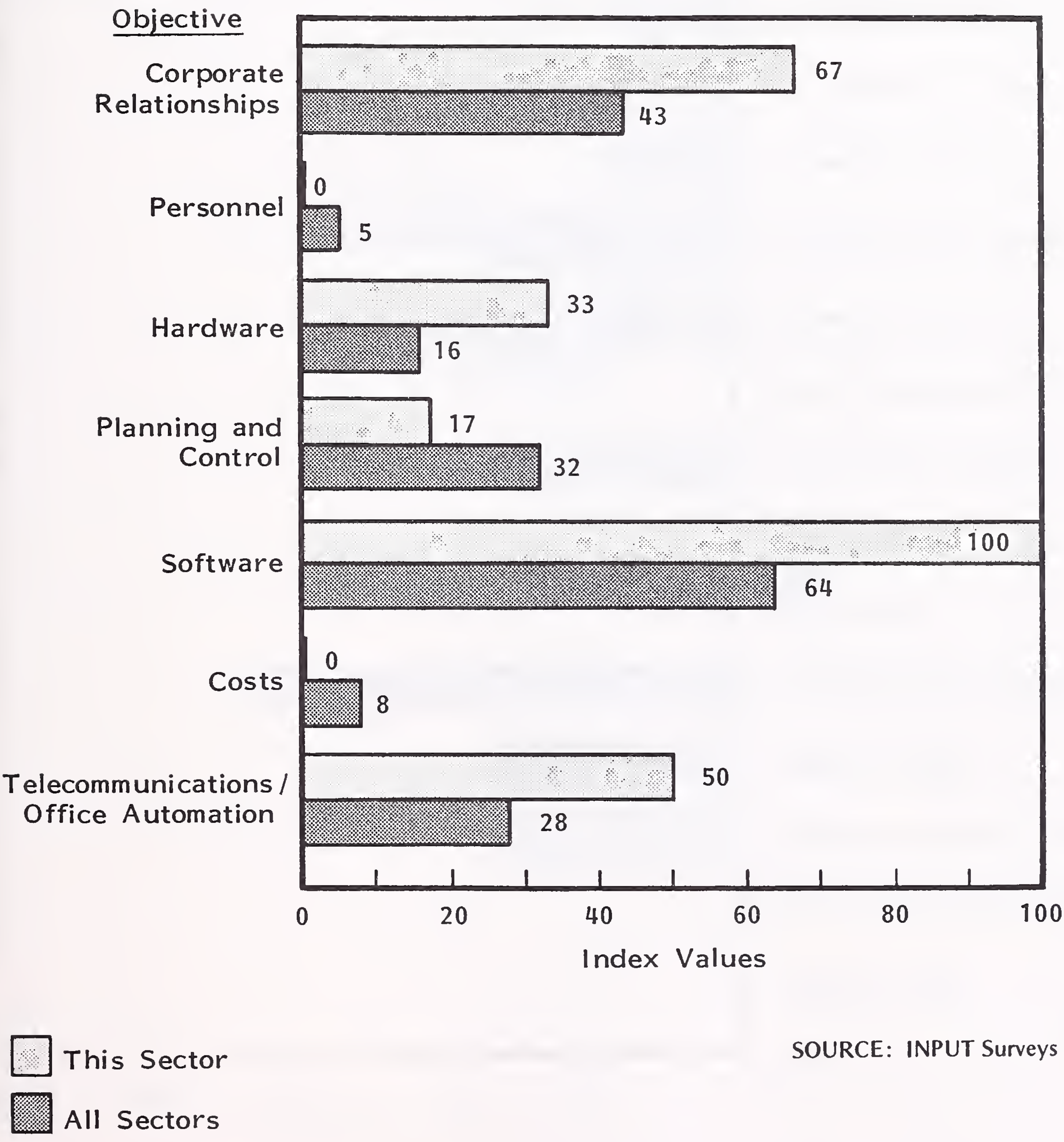
INFORMATION SYSTEMS PROBLEMS IN THE TRANSPORTATION SECTOR: DETAIL



SOURCE: INPUT Surveys

EXHIBIT III-55

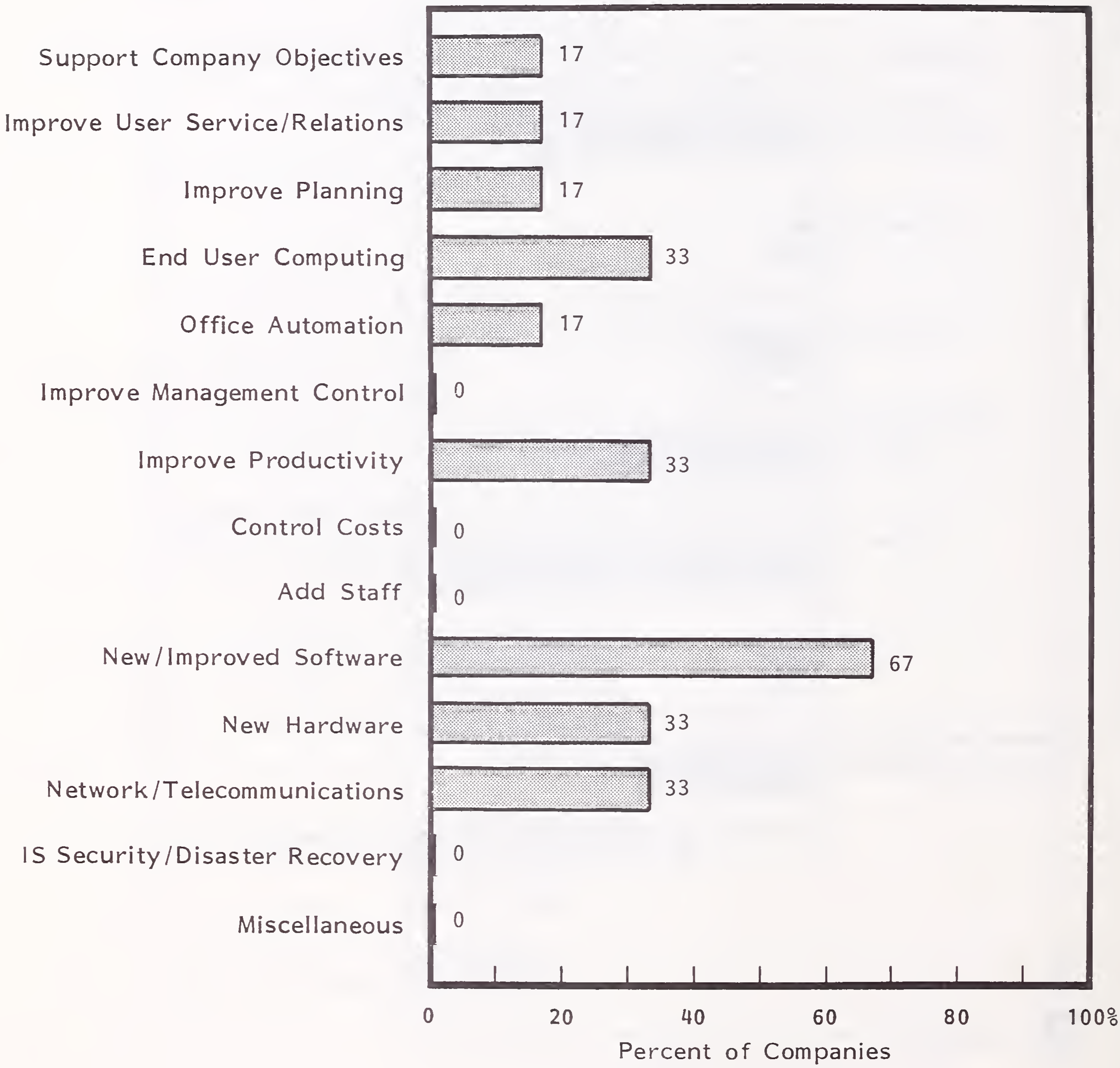
INFORMATION SYSTEMS OBJECTIVES IN THE TRANSPORTATION SECTOR: SUMMARY



SOURCE: INPUT Surveys

EXHIBIT III-56

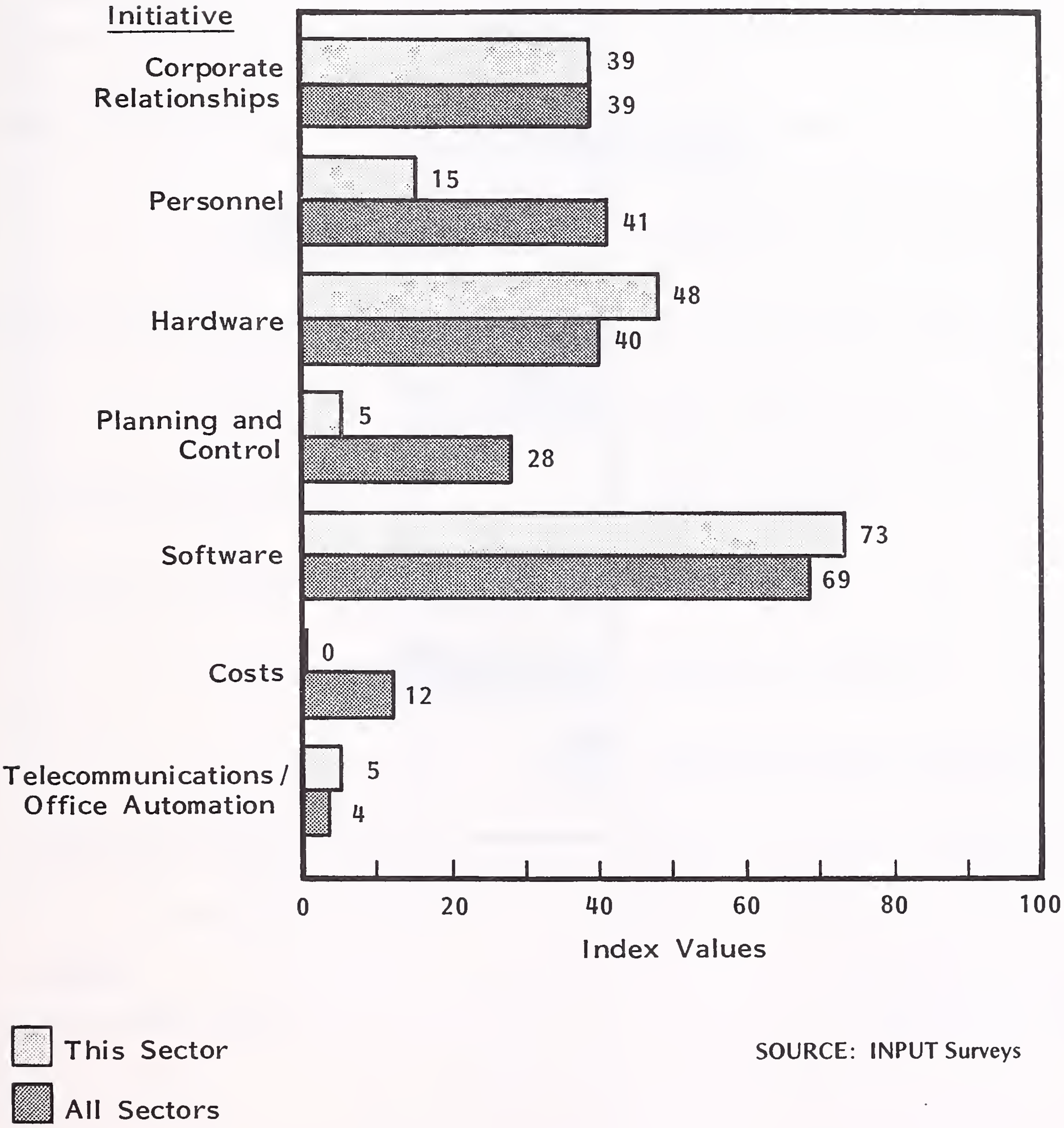
INFORMATION SYSTEMS PLANNING OBJECTIVES IN THE TRANSPORTATION SECTOR: DETAIL



SOURCE: INPUT Surveys

EXHIBIT III-57

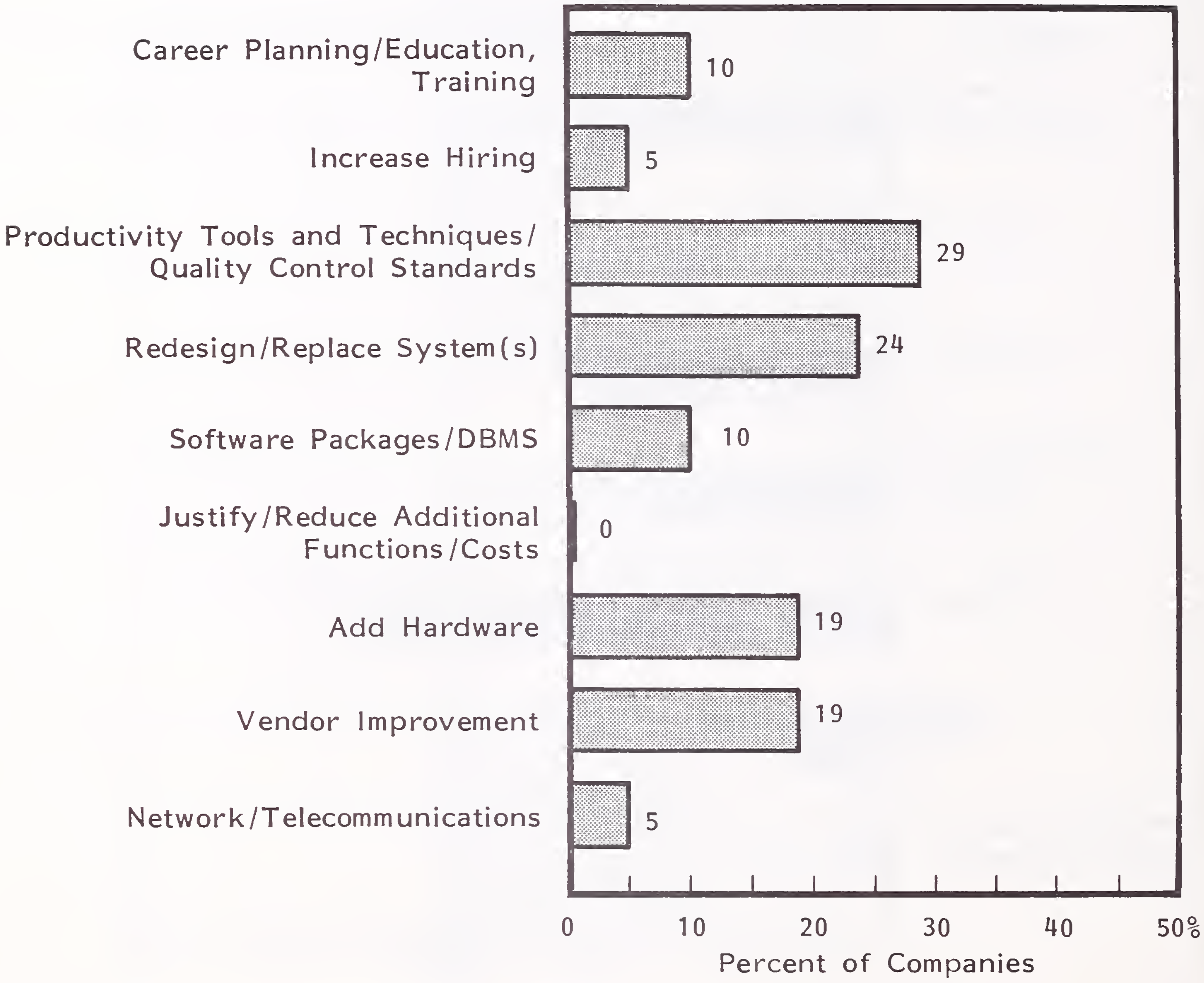
INFORMATION SYSTEMS INITIATIVES IN THE TRANSPORTATION SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-58

INFORMATION SYSTEMS INITIATIVES PLANNED IN THE TRANSPORTATION SECTOR

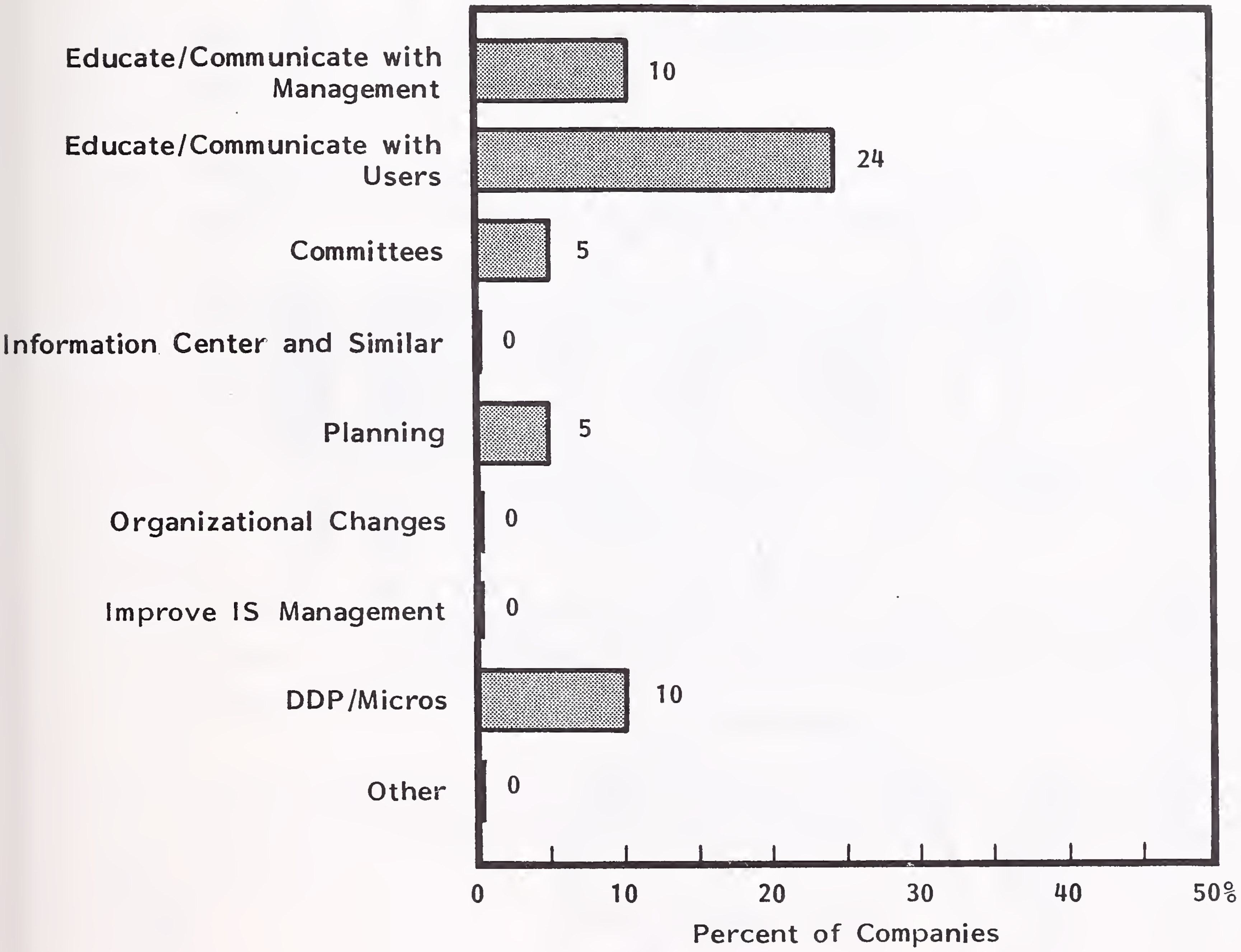


Continued

SOURCE: INPUT Surveys

EXHIBIT III-58 (Cont.)

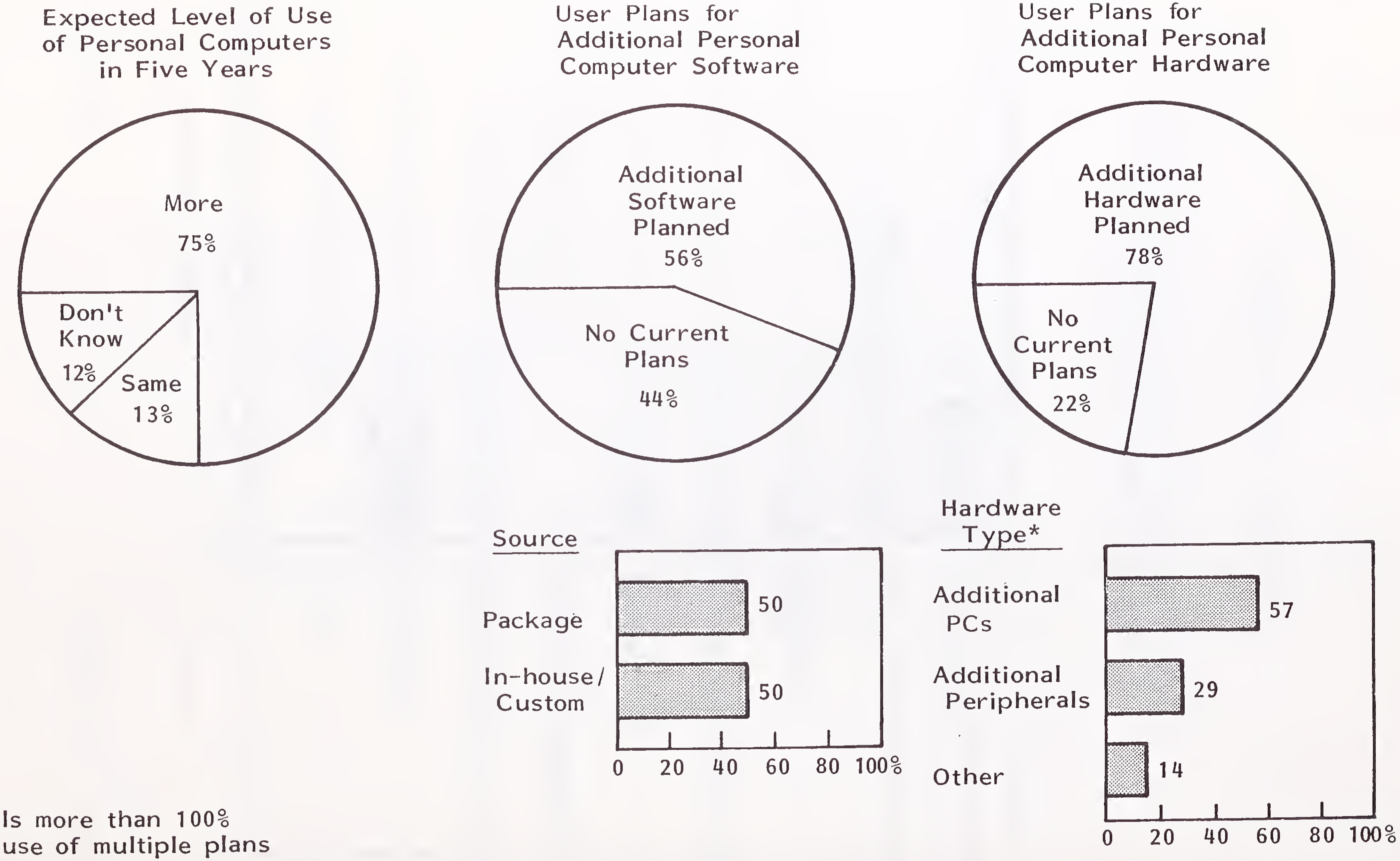
INFORMATION SYSTEMS INITIATIVES PLANNED IN THE TRANSPORTATION SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-59

PERSONAL COMPUTER ACQUISITION PLANS IN THE TRANSPORTATION SECTOR



* Totals more than 100% because of multiple plans

SOURCE: INPUT Surveys

  - The overall level of use in five years.

  - Plans for obtaining additional personal computer software.

  - Plans for obtaining additional personal computer hardware.

- These plans are similar to those in industry generally, except that more custom software is planned.

- Exhibit III-60 shows the types of personal computer software packages now used. The non-Calc packages are used far less in this section.

- The general categories of applications used are summarized in Exhibit III-61. The general profile is similar to other sectors, but the overall intensity of use is less.

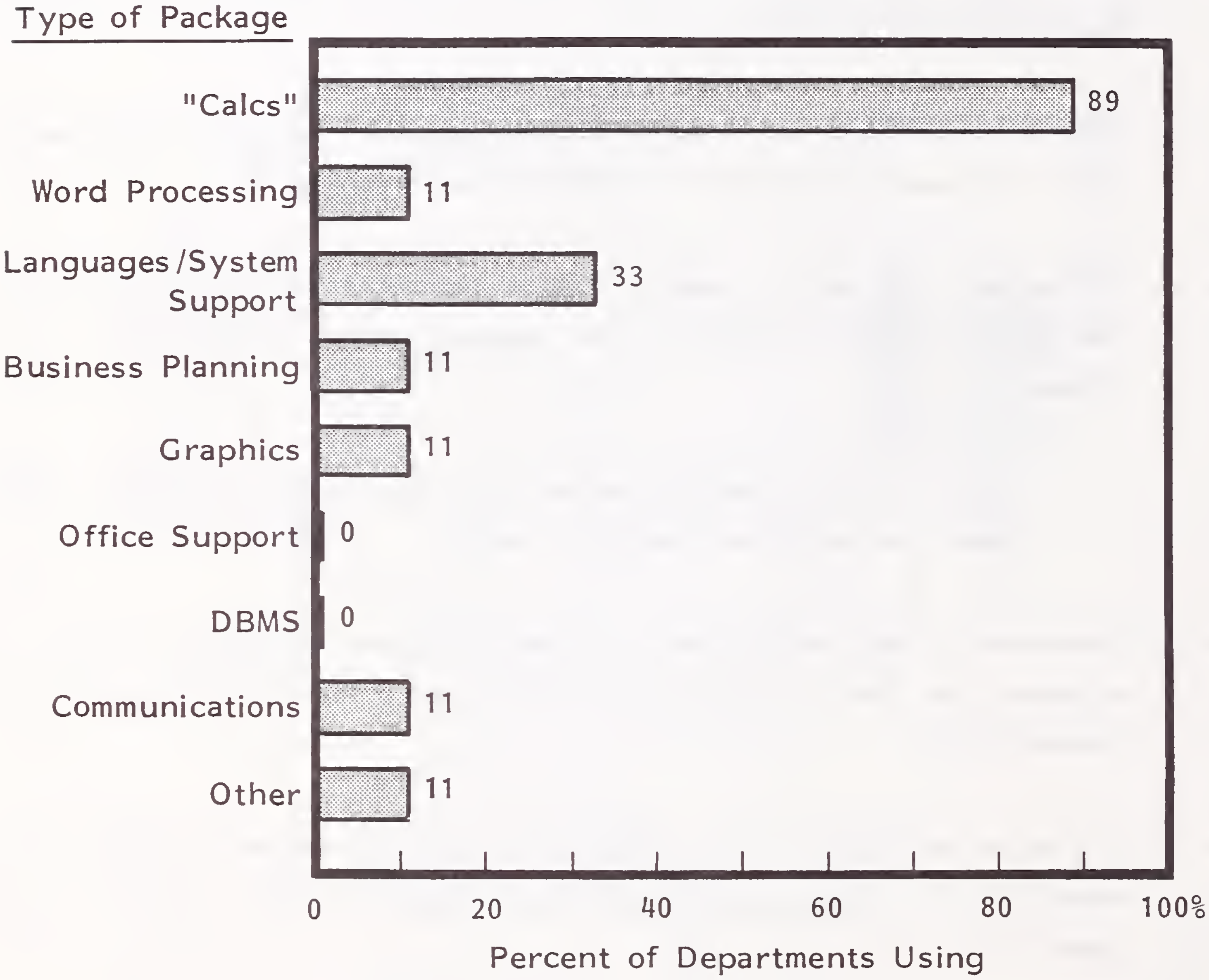
  - Exhibit III-62 provides examples of actual personal computer applications in use in the transportation sector.

- Compared to the average user, personal computer users in this sector are somewhat less likely to rely on the IS department for assistance, as shown in Exhibit III-63.

- In this sector 100% of departments using personal computers have had their installation less than a year, as shown in Exhibit III-64, compared to 78% generally.

EXHIBIT III-60

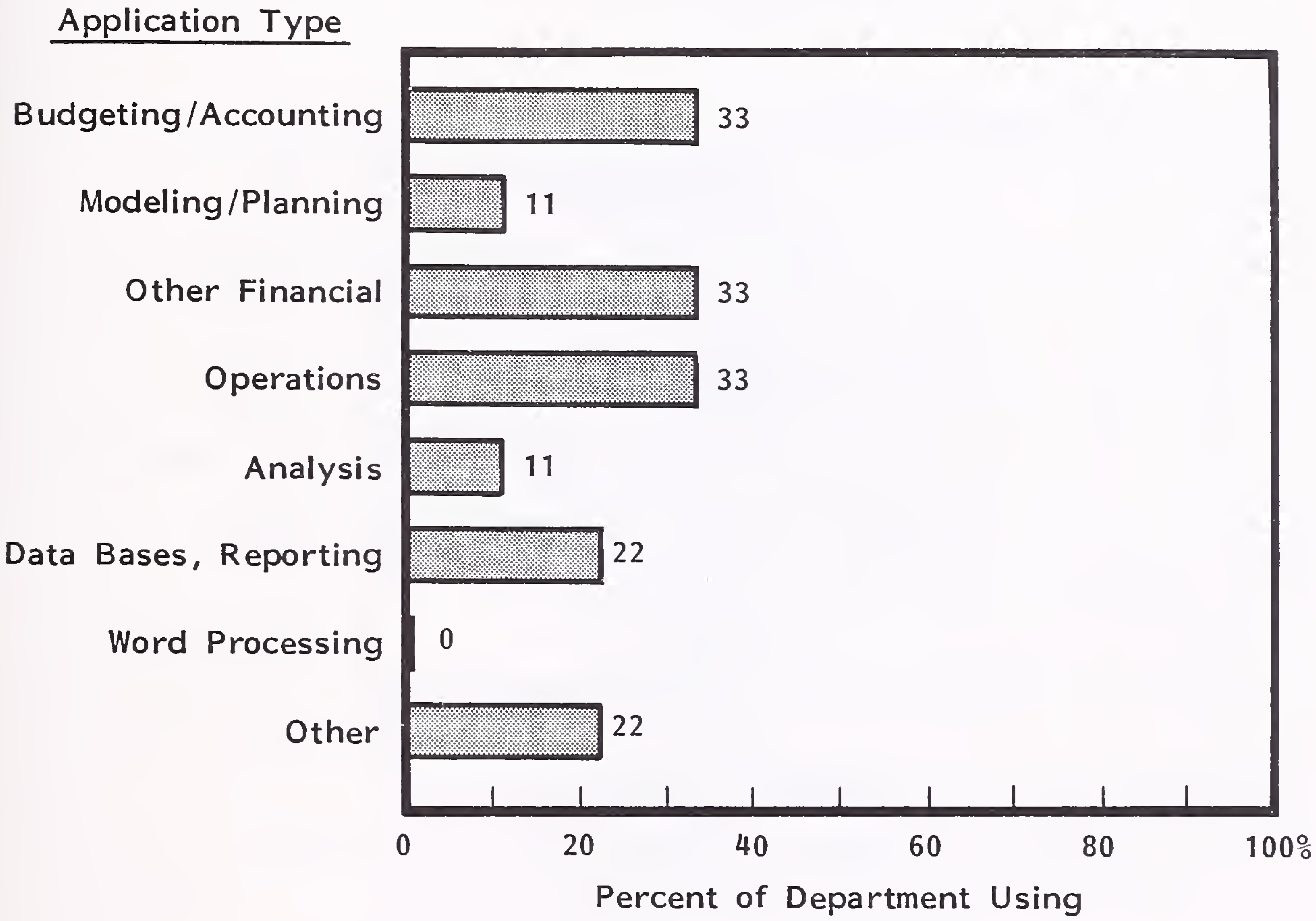
TYPES OF PERSONAL COMPUTER SOFTWARE PACKAGES USED IN THE TRANSPORTATION SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-61

PERSONAL COMPUTER APPLICATIONS IN THE TRANSPORTATION SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-62

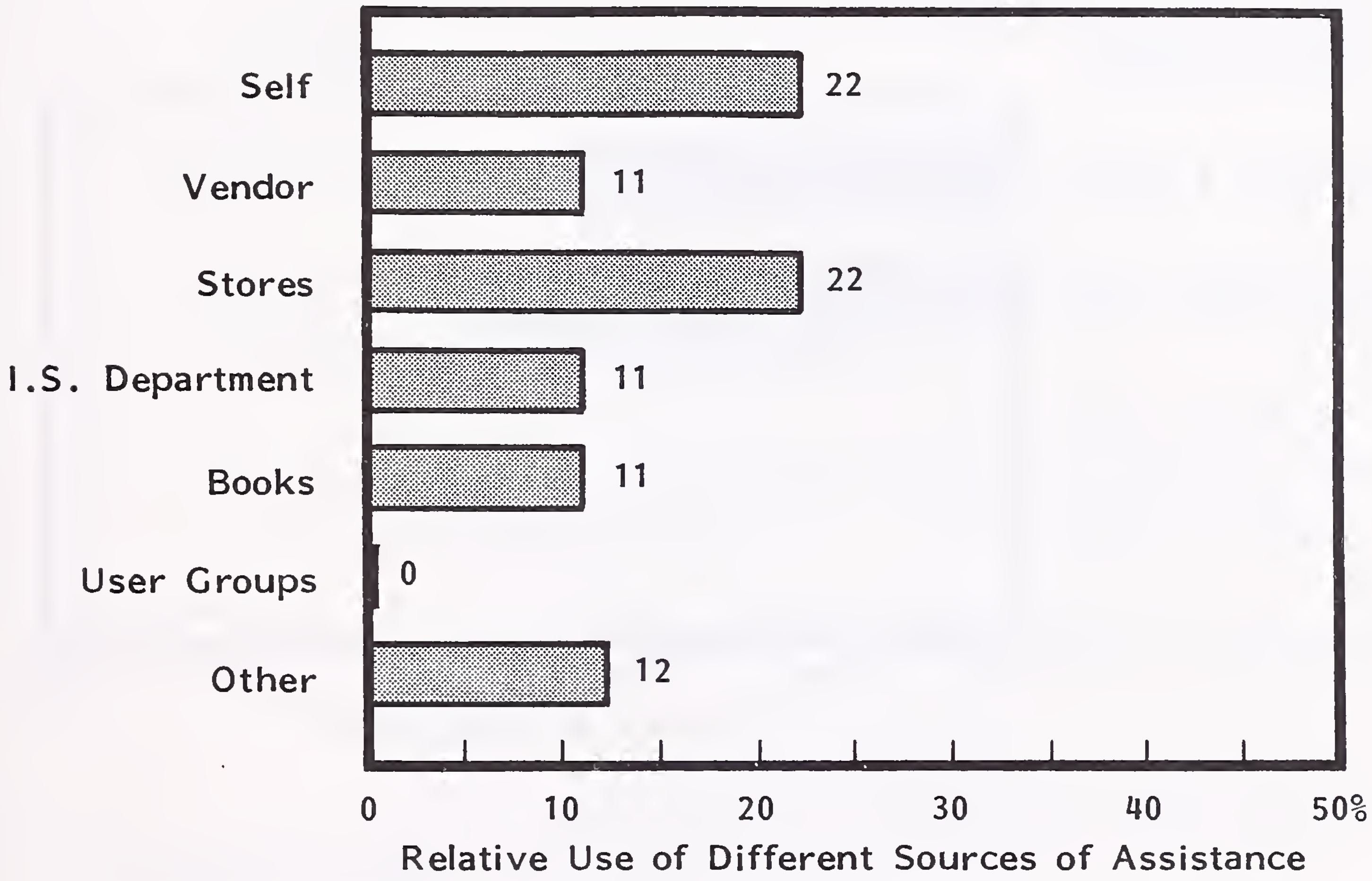
PERSONAL COMPUTER APPLICATIONS IN THE TRANSPORTATION SECTOR

Engineering
Spread Sheets
Graphics
Financial Planning and Modeling
Balancing
Financial Statements
Train Operations Simulation
MIT Service Planning Model
Budgets
Cost Control
Labor
Inventory Control

SOURCE: INPUT Surveys

EXHIBIT III-63

SOURCES OF ASSISTANCE FOR PERSONAL COMPUTER USERS IN THE TRANSPORTATION SECTOR

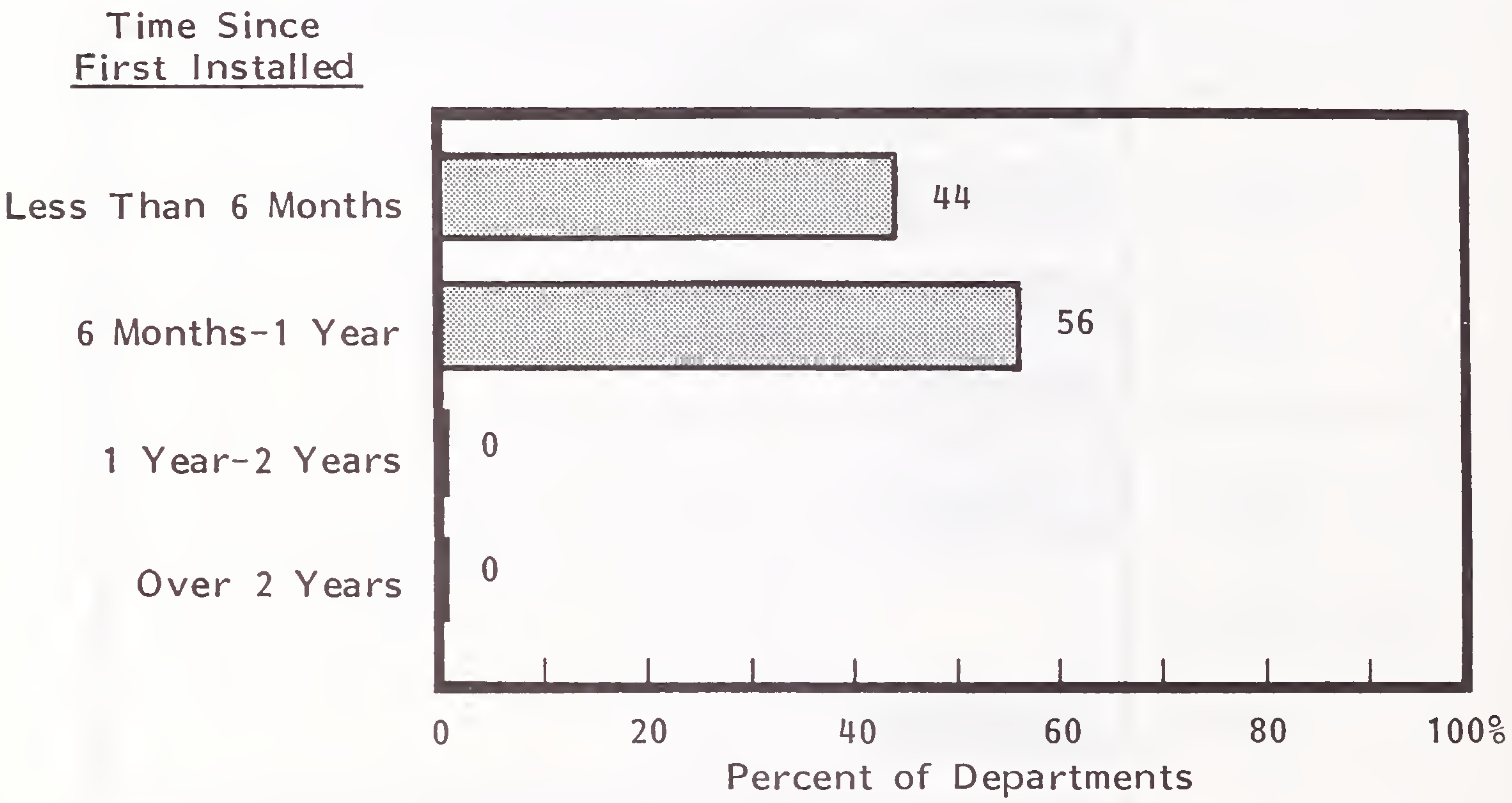


Note: Total Is More Than 100% Because of Multiple Sources.

SOURCE: INPUT Surveys

EXHIBIT III-64

TIME SINCE FIRST PERSONAL COMPUTER INSTALLED IN USER DEPARTMENTS IN THE TRANSPORTATION SECTOR



SOURCE: INPUT Surveys

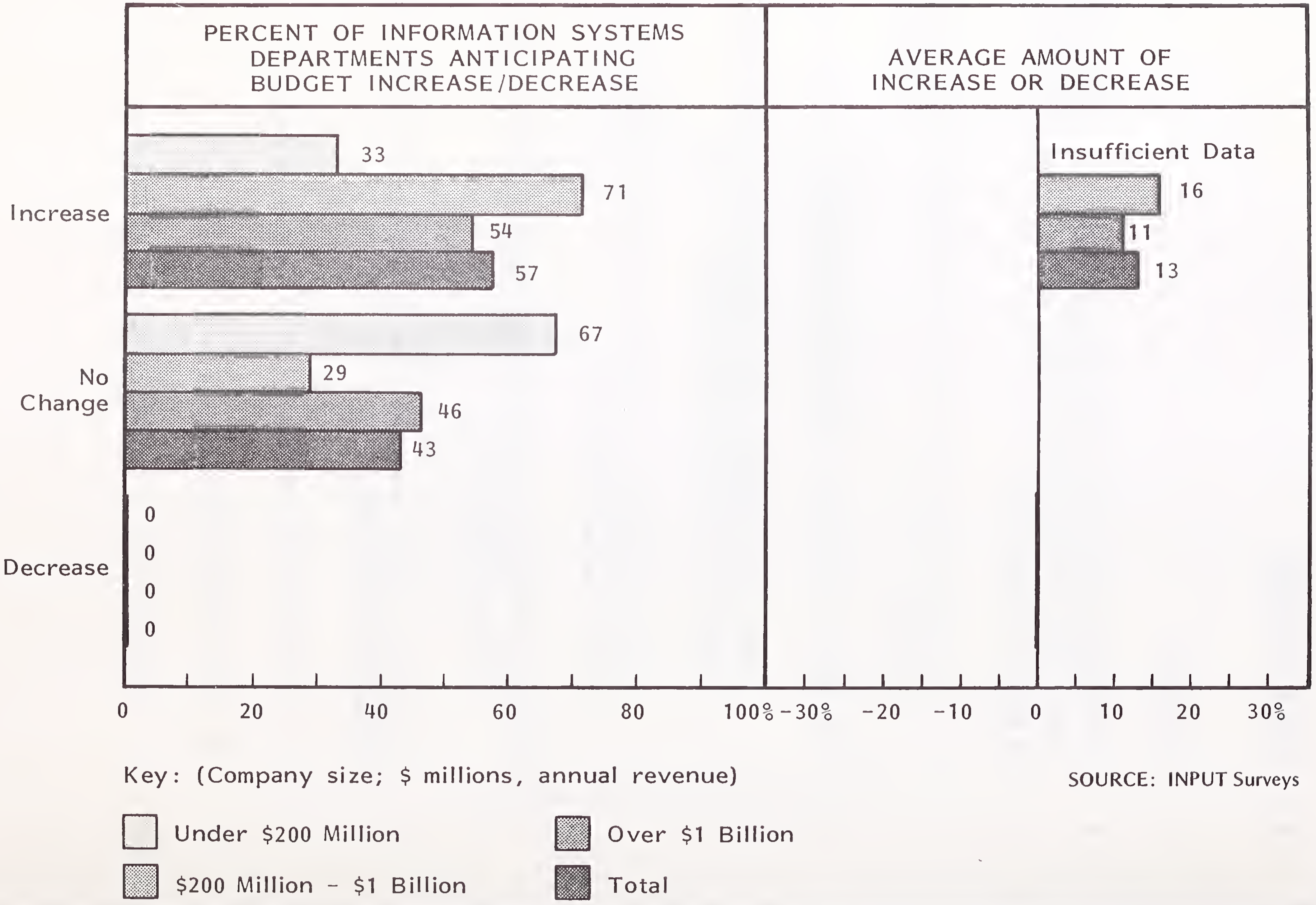
E. UTILITY SECTOR

1. BUDGETS

- In this sector 57% of the companies expect budget increases in 1983, compared to 61% generally; none expects a decrease, compared to 8% generally, as shown in Exhibit III-65.
  - Companies expecting to increase their budgets foresee an average rise of 13%.
- The budget increases expected vary by company size.
  - Large companies: 54% expect increases in the utility sector, compared to 63% for large companies generally.
  - Medium companies: 71% expect increases, compared to 63% for medium companies generally.
  - Small companies: 33% expect increases, compared to 57% for small companies generally.
- The average budget growth expected for 1983 in the utility sector is 7%, compared to 16% in 1982.
  - This represents a decline of 56% in the rate of increase.
- The 1982 IS budget distribution is shown in Exhibit III-66.
  - No one category stands out as having a significant increase for 1983.

EXHIBIT III-65

ANTICIPATED BUDGET INCREASES FOR 1983 IN THE UTILITIES SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-66

1982 BUDGET DISTRIBUTION AND 1982/1983 CHANGES IN THE UTILITIES SECTOR

BUDGET CATEGORY	PERCENT OF IS BUDGET (1982)	EXPECTED CHANGE 1982 to 1983
Personnel	47%	11%
Hardware		
Mainframe	21	9
Mini/Microcomputer	<1	12
Terminals	2	5
Peripherals	4	2
Communications	3	8
Software and Services		
Software	2	7
Processing Services	1	3
Software Maintenance	1	5
Hardware Maintenance	6	6
Other	13	5
Total	100%	7%

SOURCE: INPUT Surveys

- Exhibit III-67 shows the range of the ratios between the IS budget and the company's total revenues which exist in the utility sector.

  - The IS percentage of total revenues for the average company (i.e., for 50% of respondents) in each size group was:

    - For large companies: 0.7%, compared to 0.55% for this size company generally.

    - For medium companies: 0.9%, compared to 0.8% for this size company generally.

    - For small companies: 0.5%, compared to 1.2% for this size company generally.

  - The companies that spend least on data processing as a percentage of revenues are those at and below the 20% mark. Their IS spending percentages were:

    - Large companies: 0.2%.

    - Medium companies: 0.25%.

    - Small companies: 0.2%.

  - The companies that spend the most on data processing as a percentage of revenues are those at and above the 80% mark. Their IS spending percentages were:

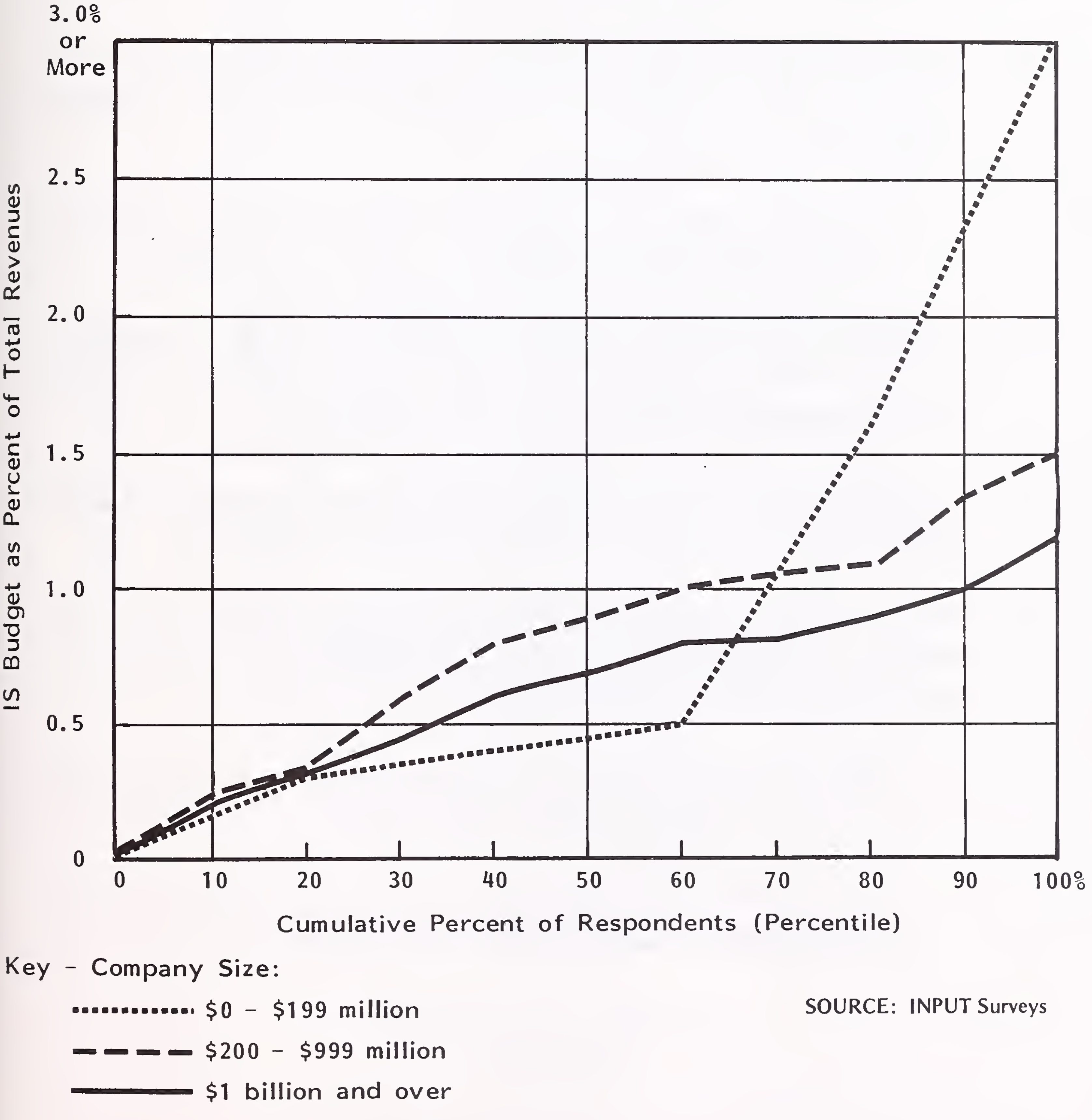
    - Large companies: 1.0%.

    - Medium companies: 1.3%.

    - Small companies: 2.4%.

EXHIBIT III-67

INFORMATION SYSTEMS BUDGET AS A PERCENT OF TOTAL REVENUES IN THE UTILITIES SECTOR



SOURCE: INPUT Surveys

- Median spending on IS per corporate employee was $1,540. However, there was a broad range of spending ratios, as shown in the diagram in Exhibit III-68.

  - The reasons for this variation were discussed in Chapter II, Section B.

2. STAFFING

- In the staffing sector, 100% of companies expect their IS staffs to increase in the next 12 months, compared to the industry average of 58%, as shown in Exhibit III-69.

  - The net increase in number of staff is expected to be 9%, compared to the all-industry average of 4%.

- Turnover in this sector is expected to be 50% greater than the all-industry average in 1983, as shown in Exhibit II-9. Current turnover rates for individual positions are not shown because of insufficient data.

- Difficulty in recruiting staff in this sector is somewhat less difficult in all job categories than the all-industry average, as shown in Exhibit III-70.

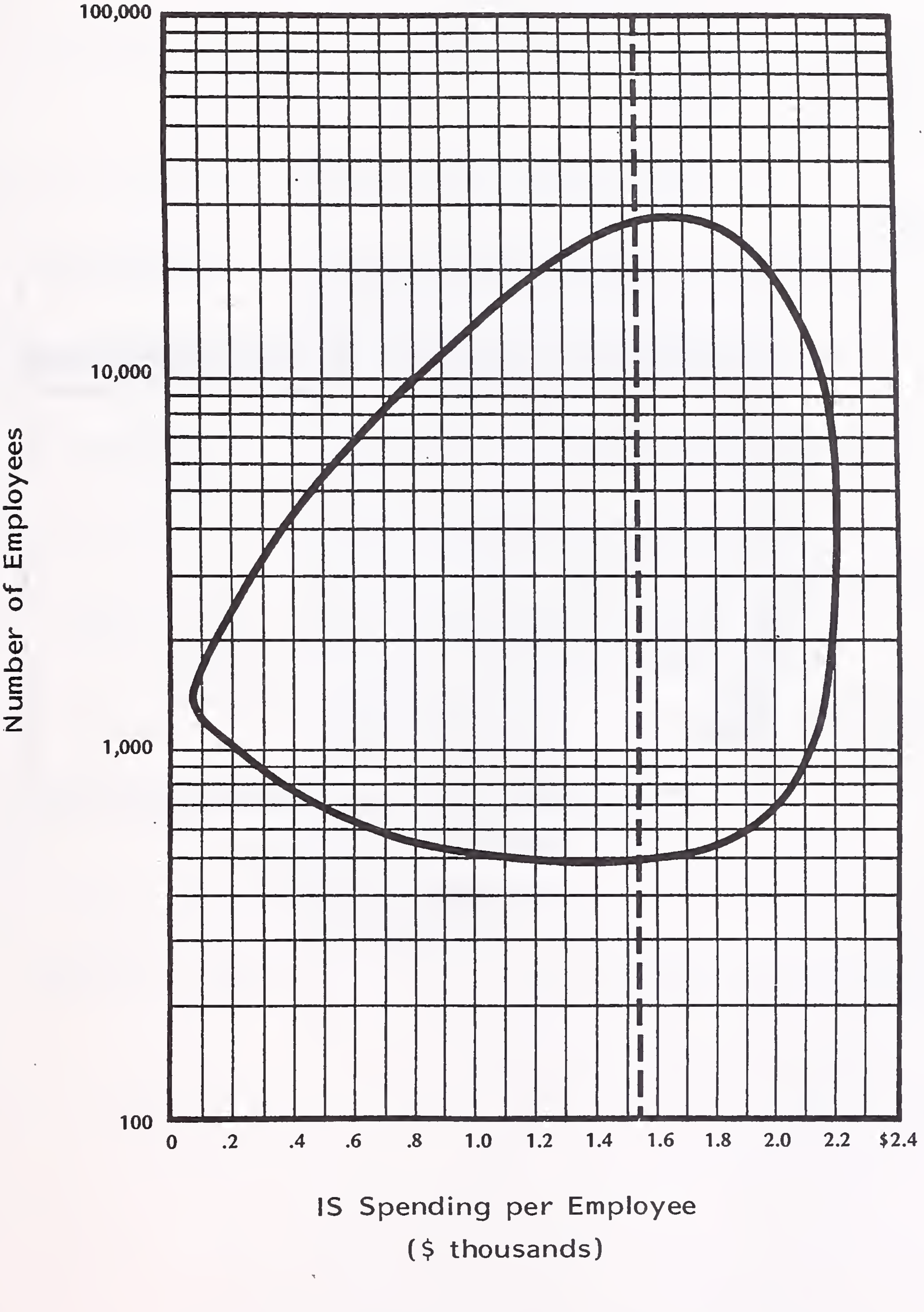
- The number of programs to be maintained averages 1,000 in this sector, although the range, both in absolute numbers and based on a company size, is quite broad, as shown in Exhibit III-71.

  - Maintenance, as a proportion of total workload, is very similar to the all-industry average, as shown in Exhibit III-72.

  - Company size is not a significant factor in affecting the new development-maintenance split, as shown in Exhibit III-73.

EXHIBIT III-68

INFORMATION SYSTEMS SPENDING PER EMPLOYEE BY COMPANY SIZE IN THE UTILITIES SECTOR

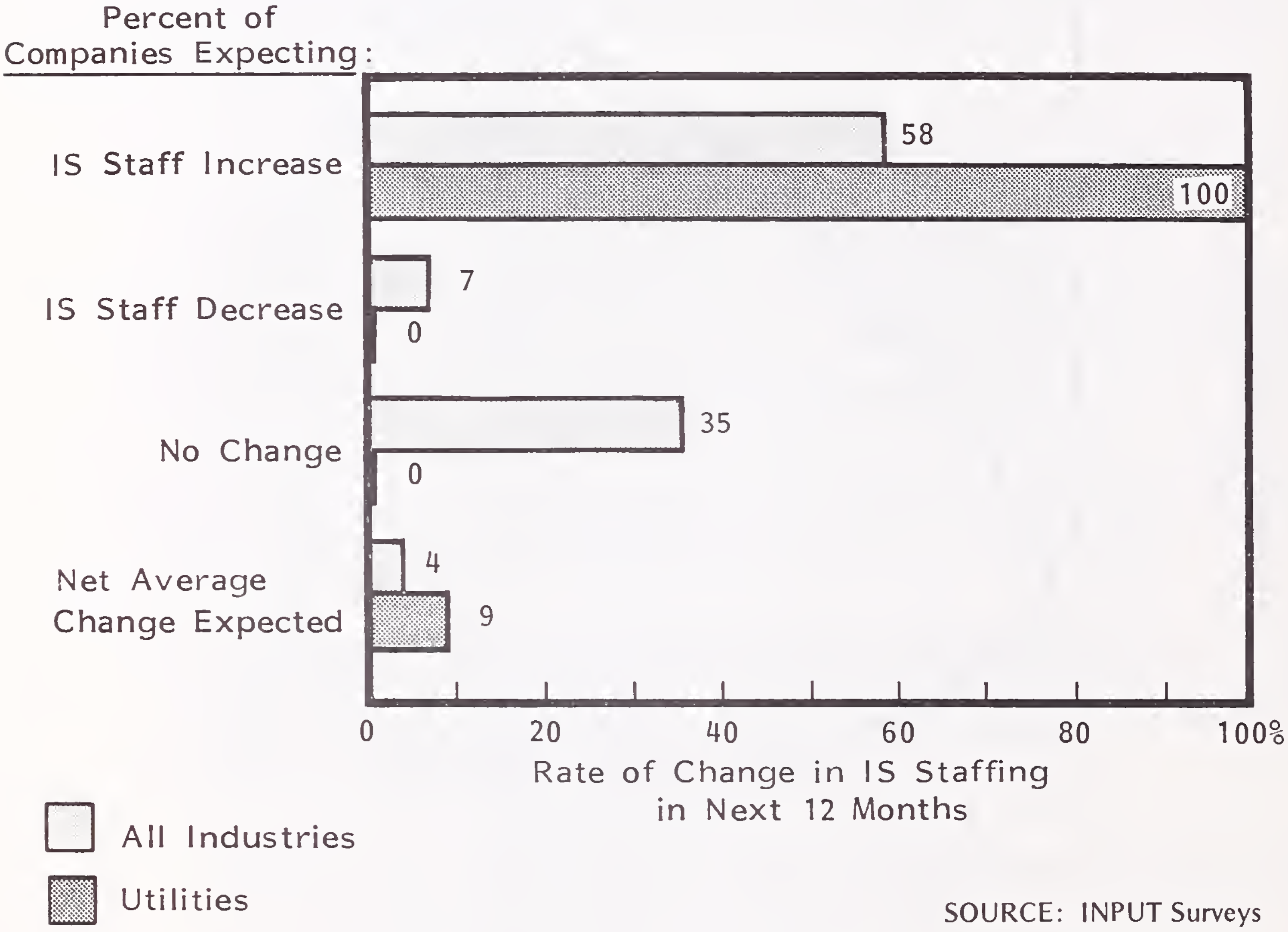


▬ ▬ ▬ ▬ = Median

SOURCE: INPUT Surveys

EXHIBIT III-69

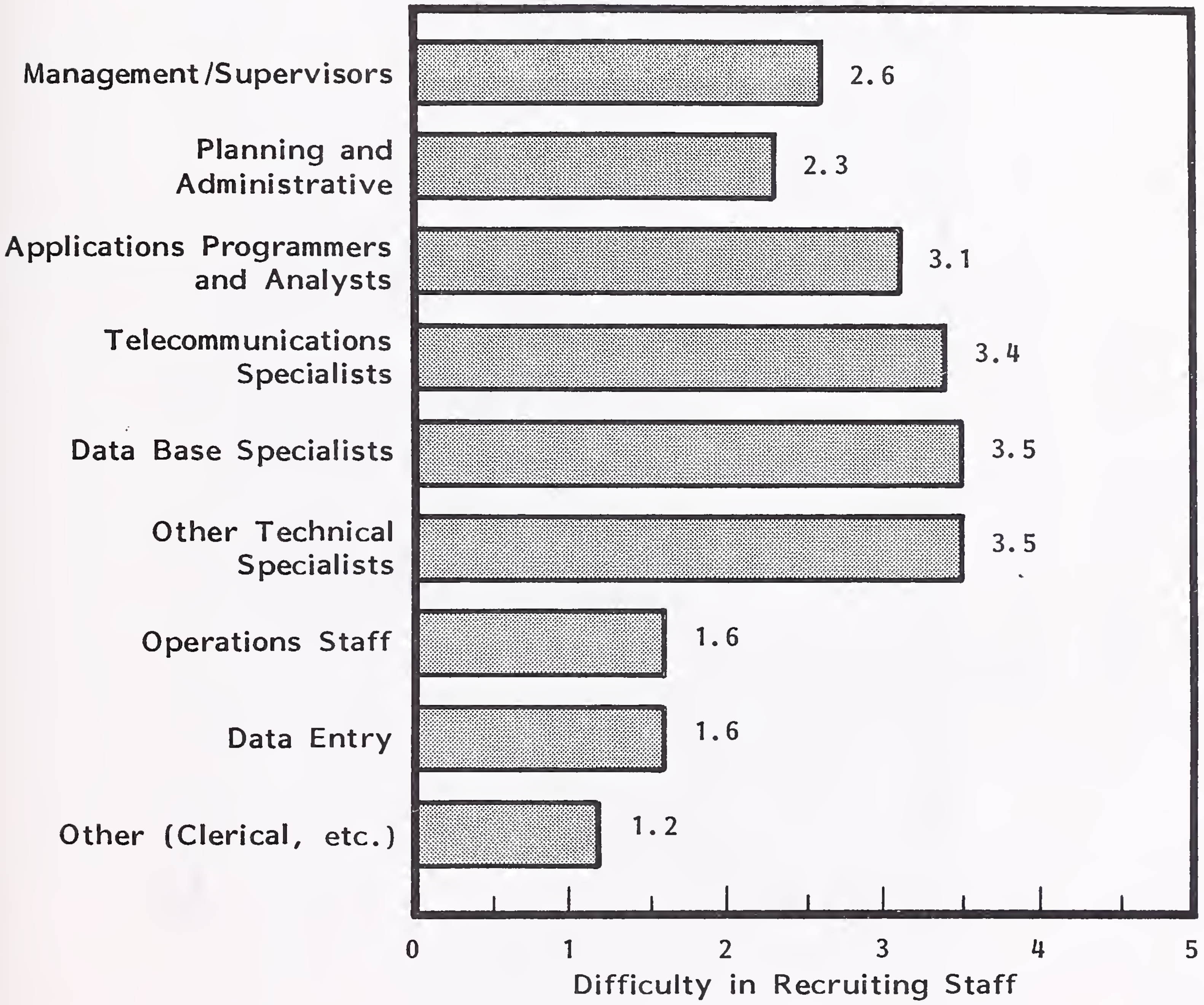
INFORMATION SYSTEMS STAFFING CHANGES EXPECTED IN THE NEXT TWELVE MONTHS IN THE UTILITIES SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-70

INFORMATION SYSTEMS DIFFICULTY IN RECRUITING STAFF IN THE UTILITIES SECTOR

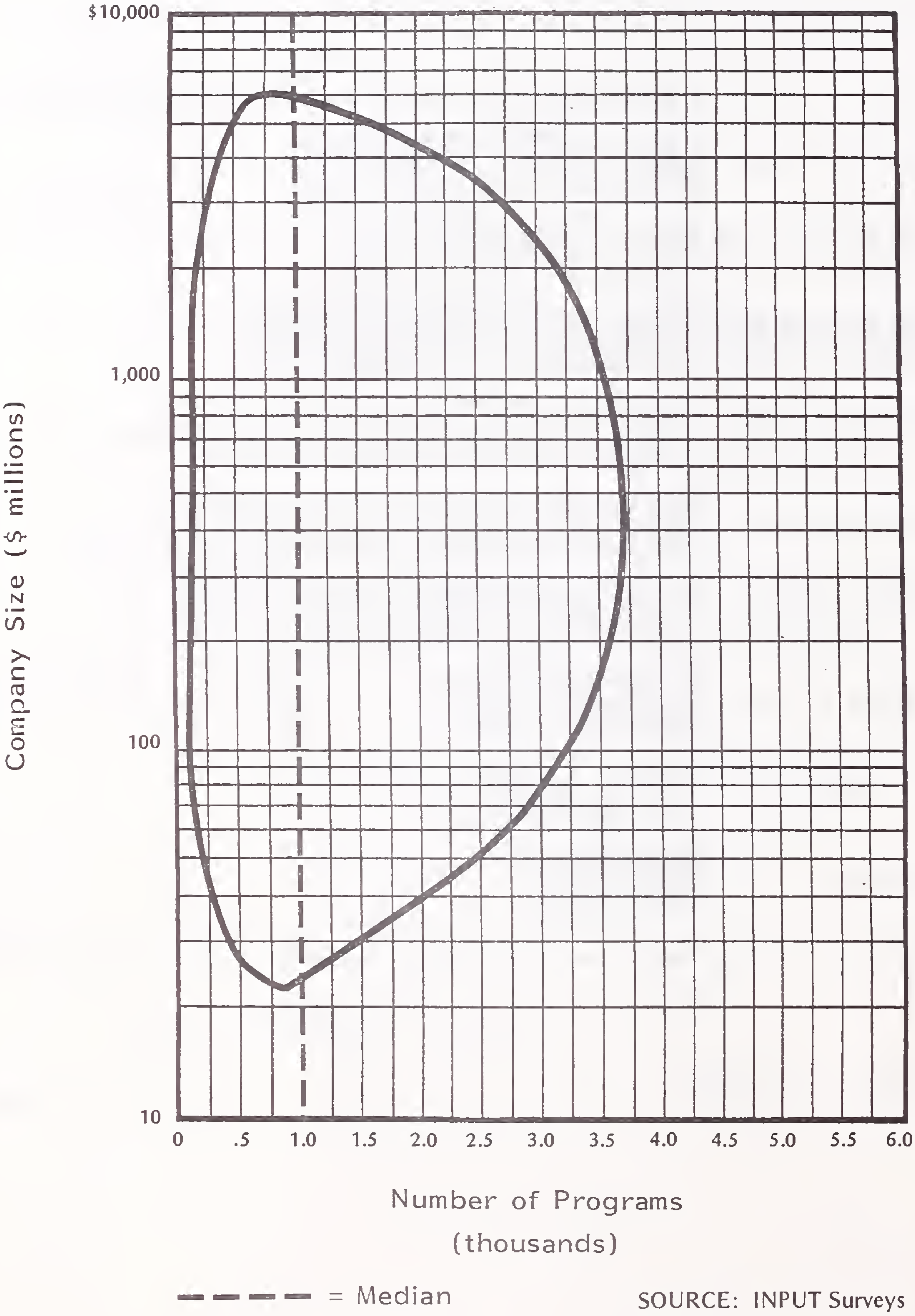


Scale: 1 = Low, 5 = High

SOURCE: INPUT Surveys

EXHIBIT III-71

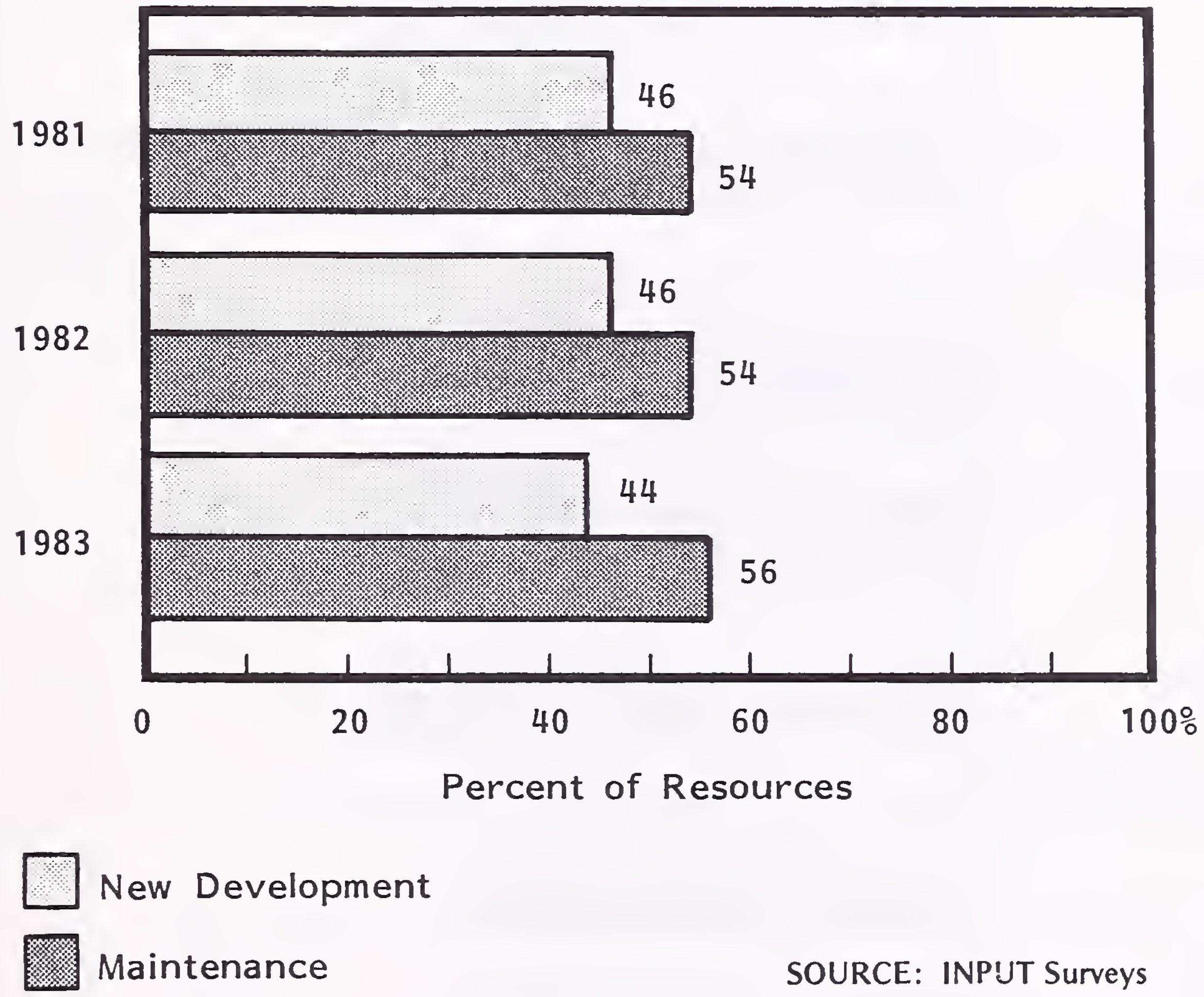
NUMBER OF PROGRAMS BY COMPANY SIZE IN THE UTILITIES SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-72

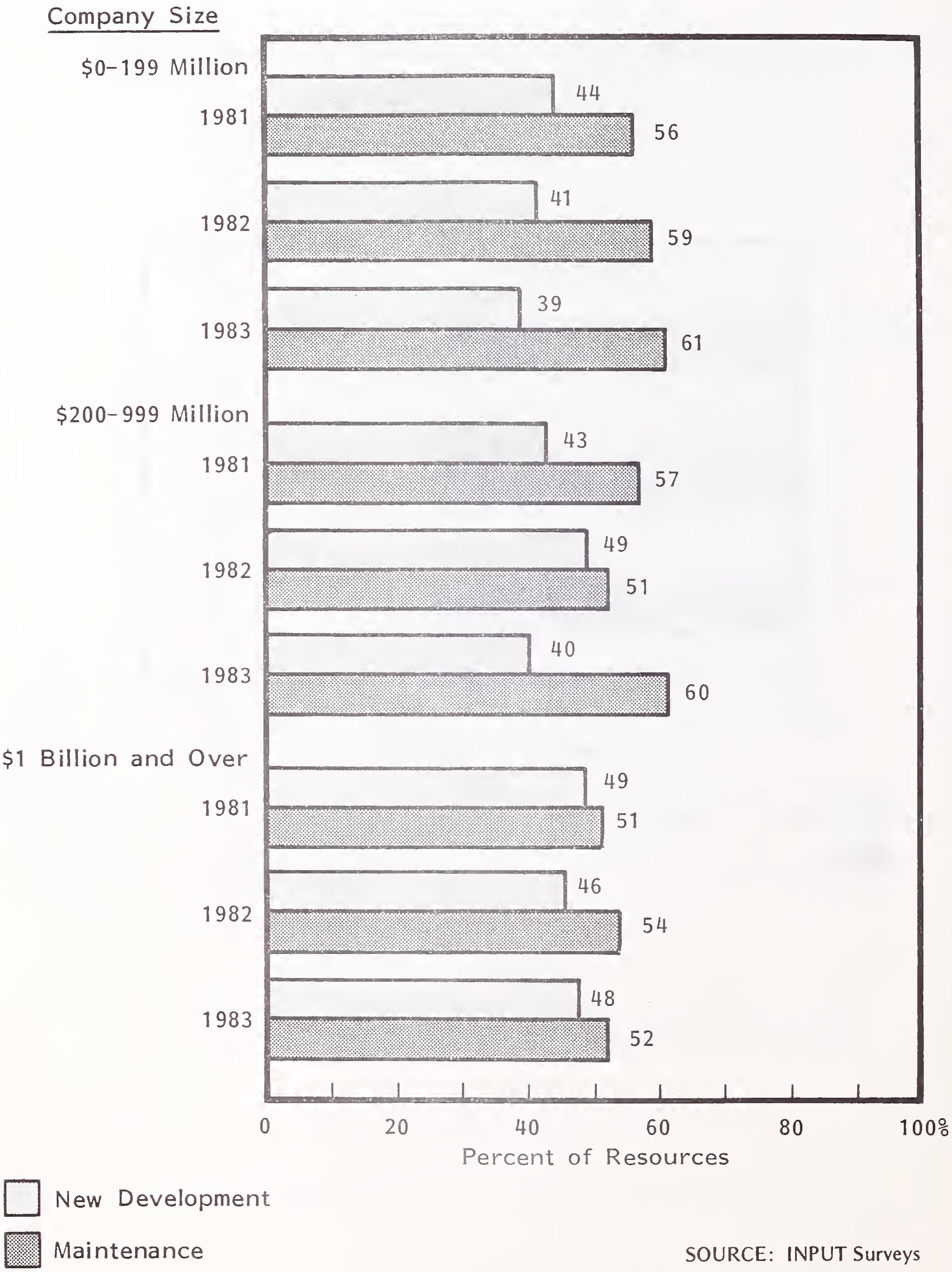
NEW PROGRAM DEVELOPMENT VERSUS MAINTENANCE IN THE UTILITIES SECTOR,
1981-1983



SOURCE: INPUT Surveys

EXHIBIT III-73

NEW PROGRAM DEVELOPMENT VERSUS MAINTENANCE IN THE UTILITIES SECTOR, 1981-1983



SOURCE: INPUT Surveys

3. INFORMATION SYSTEMS ISSUES

- Note: Please refer to Chapter II, Section D for a general discussion of IS problems, objectives, and initiatives and their interrelationships.

- Personnel and planning and control are seen as major problems more often in the utilities sector than in most other sectors, as whon in Exhibit III-74.

    - More detailed information about specific problem areas is contained in Exhibit III-75. This exhibit shows the percentage of companies in this sector which regard an issue as a major problem.

- Planning and control as well as hardware are major objectives considerably more often for the utilities sector than other sectors, as shown in Exhibit III-76.

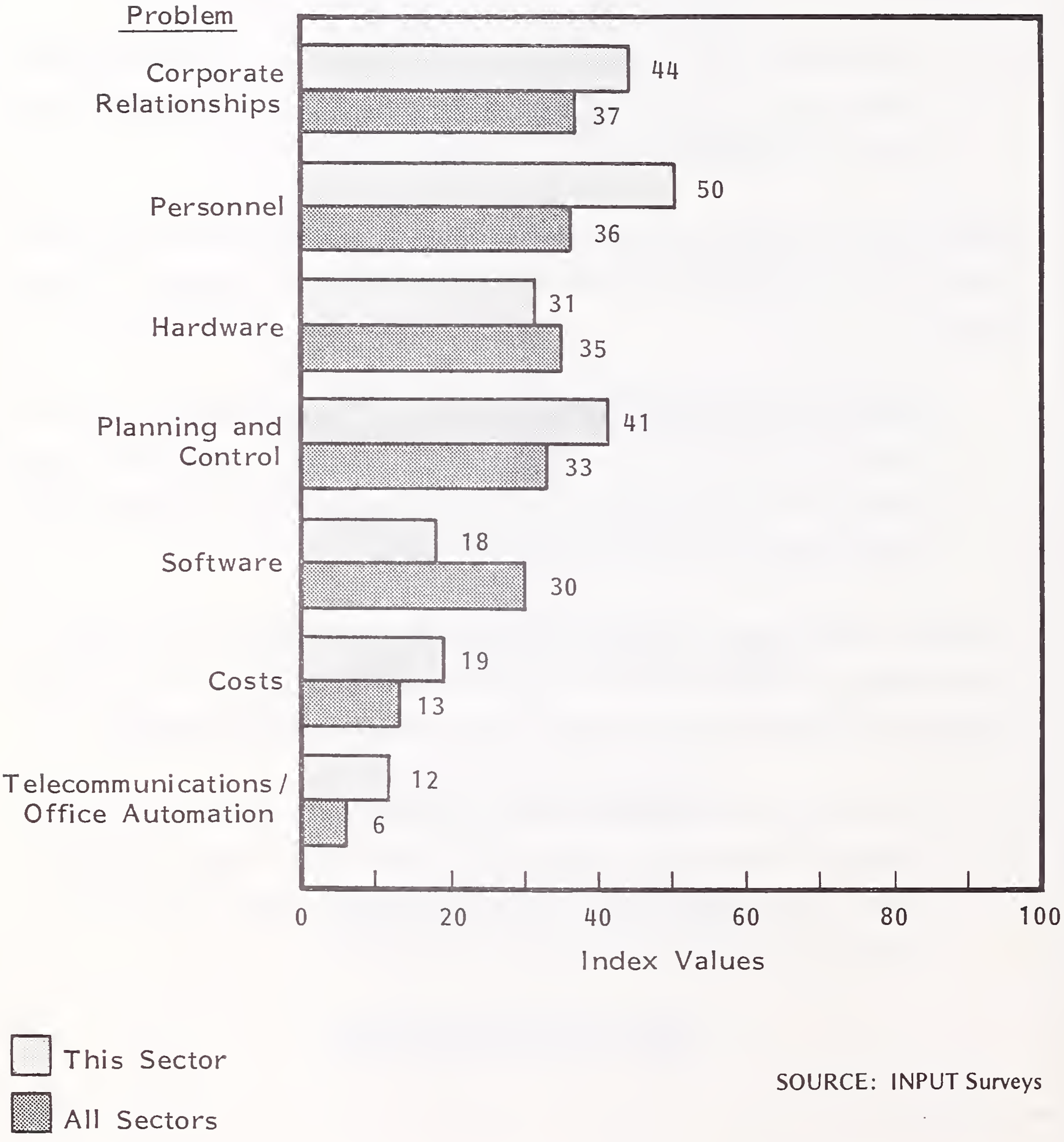
    - More detailed information about specific planning objectives is contained in Exhibit III-77. This exhibit shows the percentage of companies in this sector which have identified particular planning objectives as being of major importance to them.

- This sector plans many more major initiatives in planning and control than do other sectors, as shown in III-78. Corporate relationships is the only other area where the utility sector is planning more initiatives than average.

    - More detailed information about specific areas where an initiative is planned is contained in Exhibit III-79. This exhibit shows the percentage of companies in this sector which plan a major initiative in a particular area.

EXHIBIT III-74

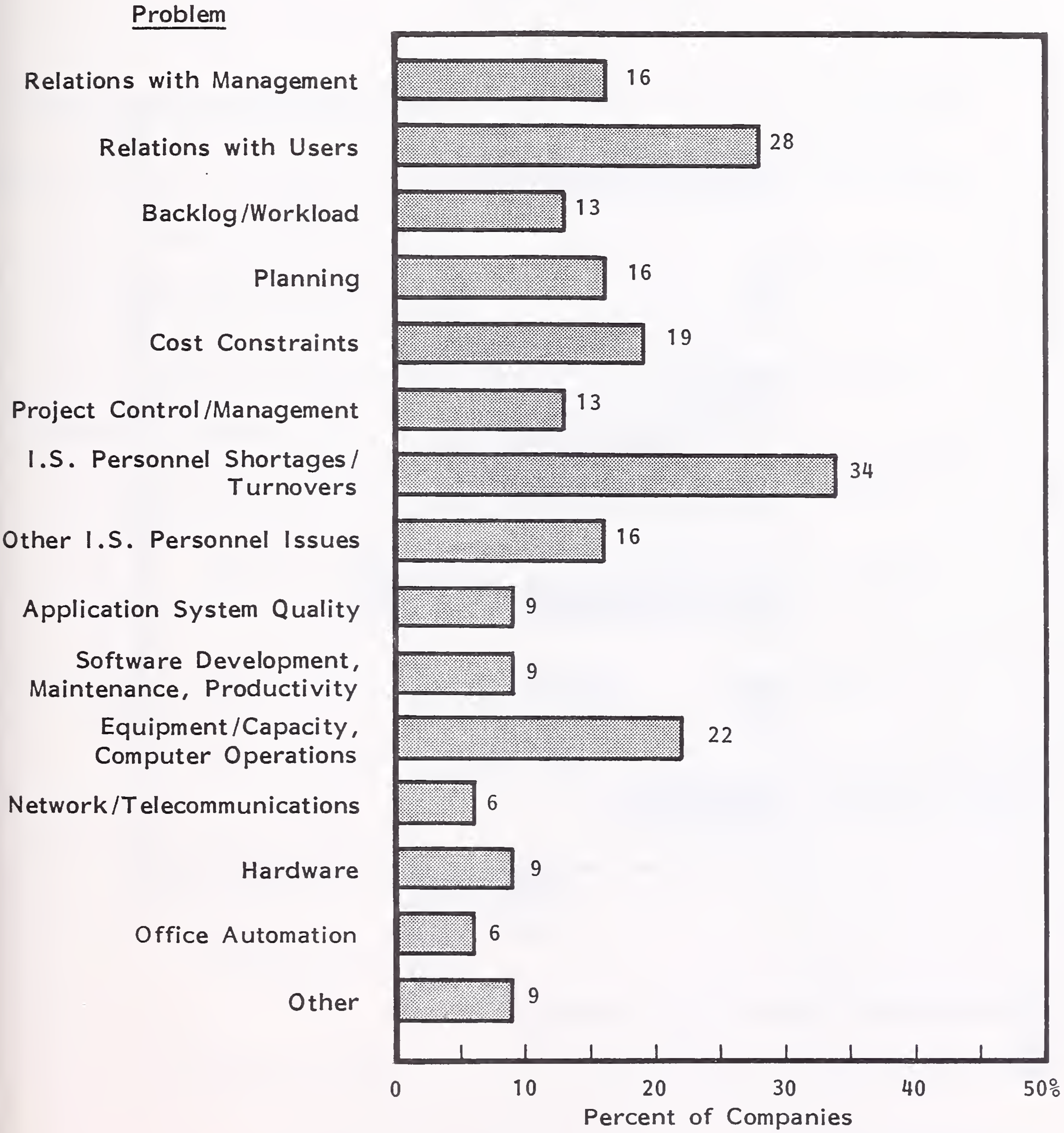
INFORMATION SYSTEMS PROBLEMS IN THE UTILITIES SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-75

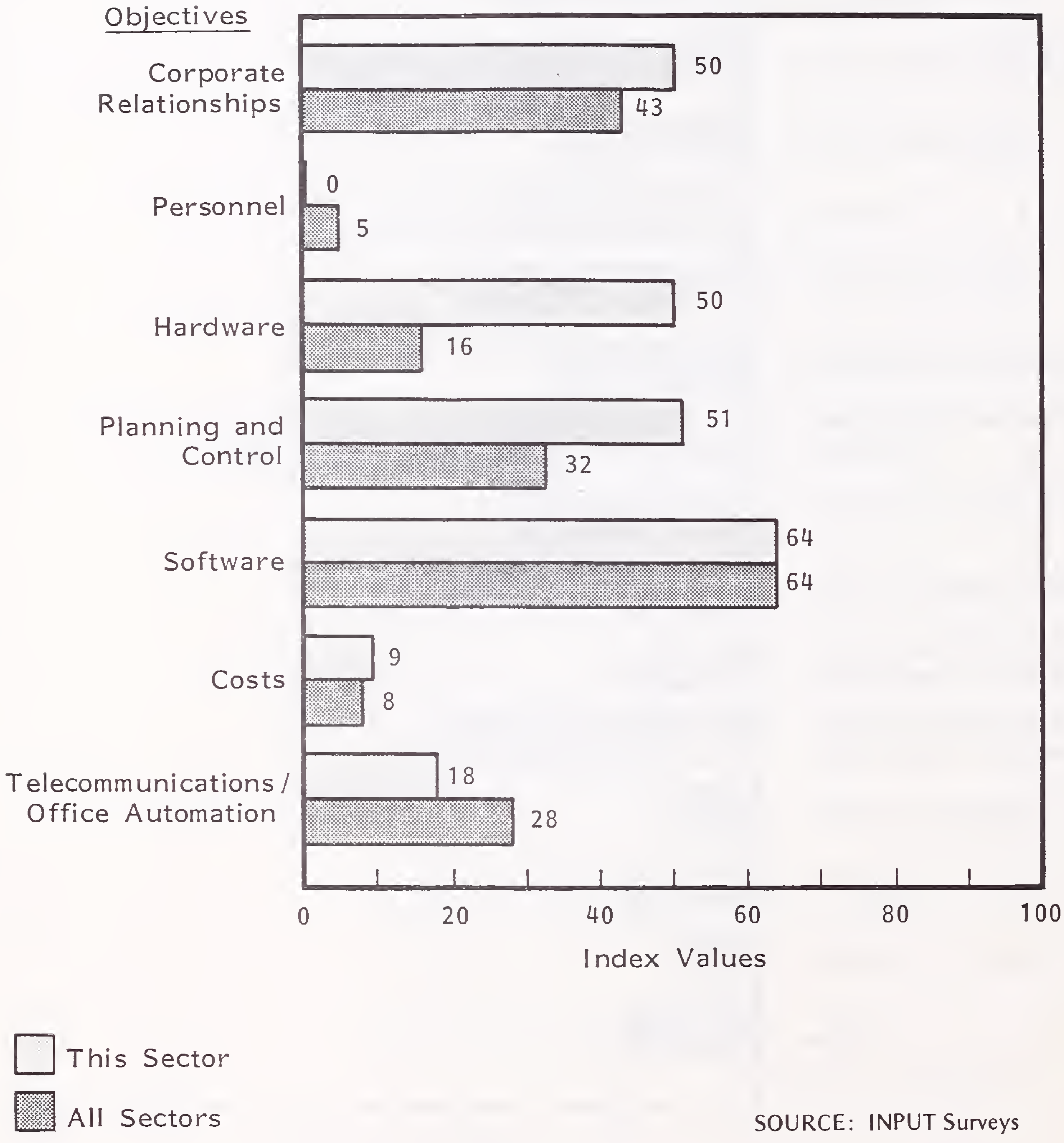
INFORMATION SYSTEMS PROBLEMS IN THE UTILITIES SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-76

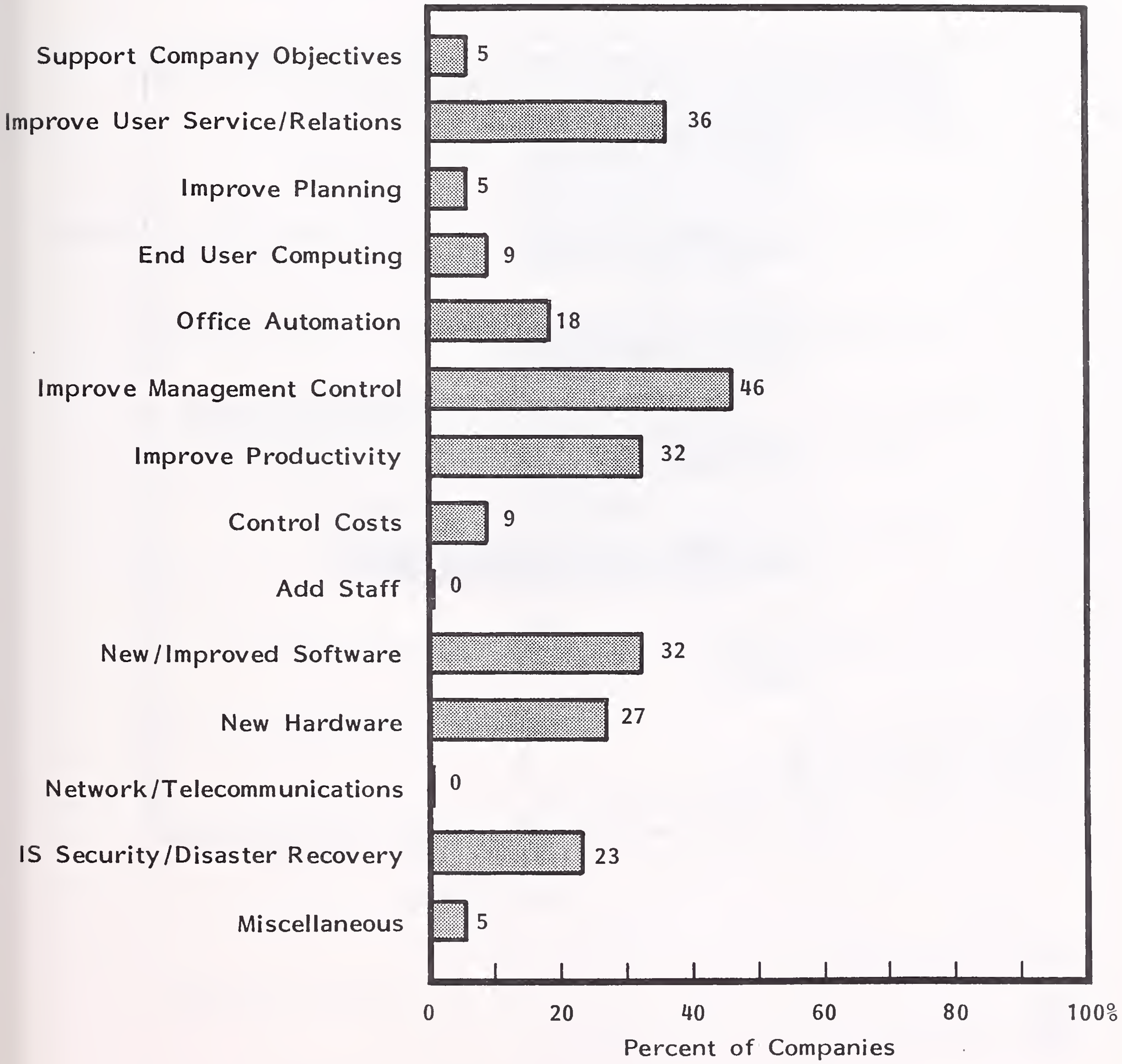
INFORMATION SYSTEMS OBJECTIVES IN THE UTILITIES SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-77

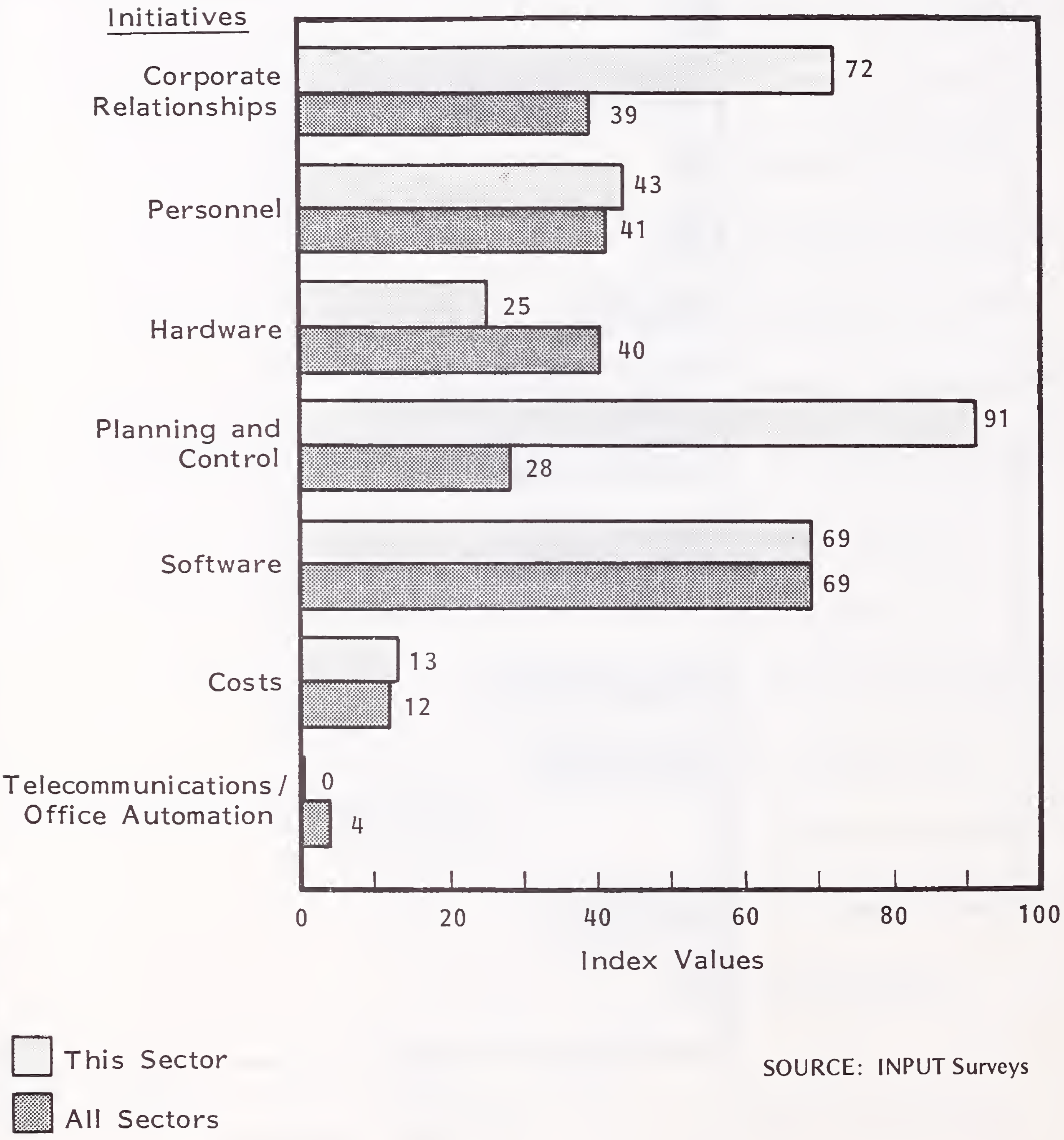
INFORMATION SYSTEMS PLANNING OBJECTIVES IN THE UTILITIES SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-78

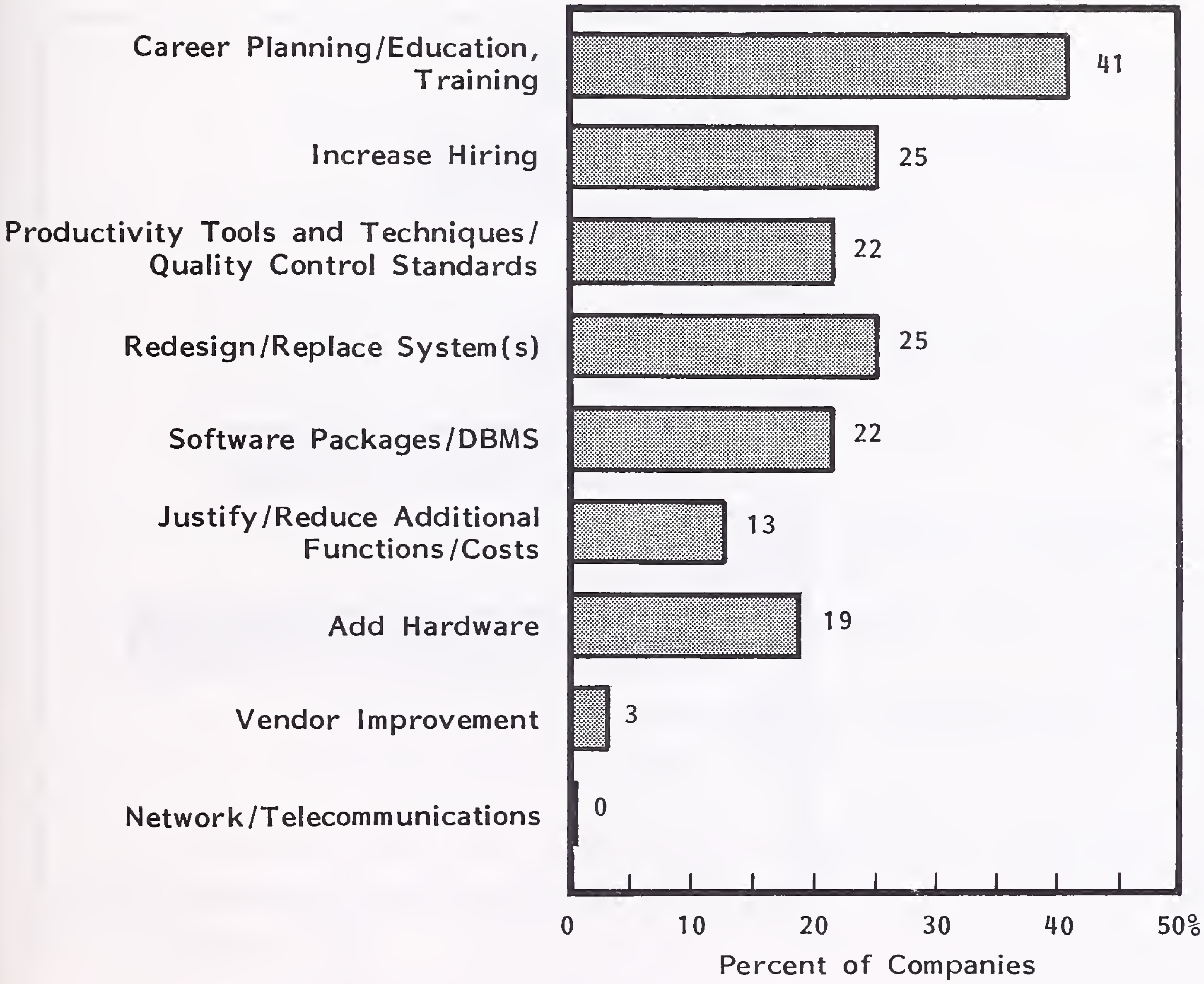
INFORMATION SYSTEMS INITIATIVES IN THE UTILITIES SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-79

INFORMATION SYSTEMS INITIATIVES PLANNED IN THE UTILITIES SECTOR

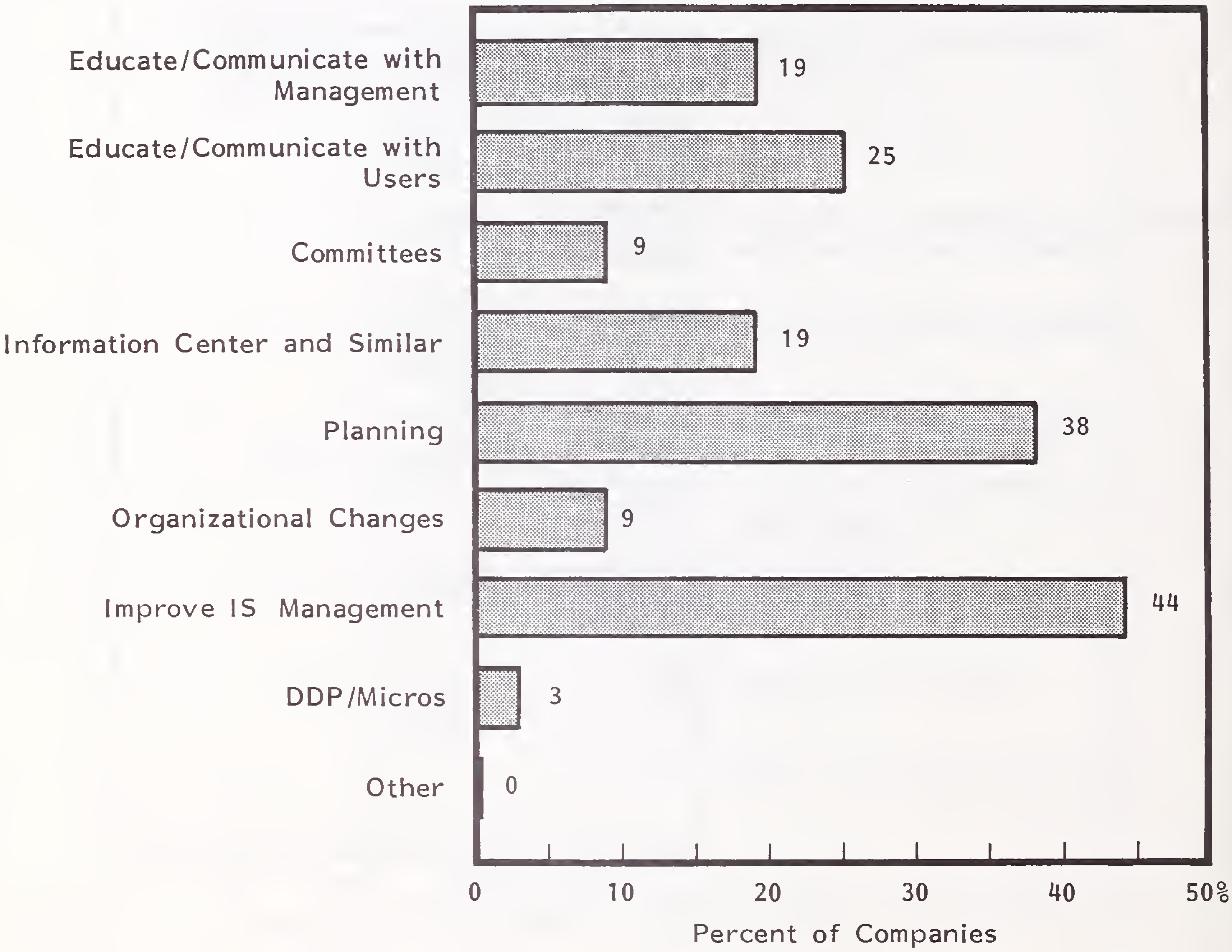


Continued

SOURCE: INPUT Surveys

EXHIBIT III-79 (Cont.)

INFORMATION SYSTEMS INITIATIVES PLANNED IN THE UTILITIES SECTOR



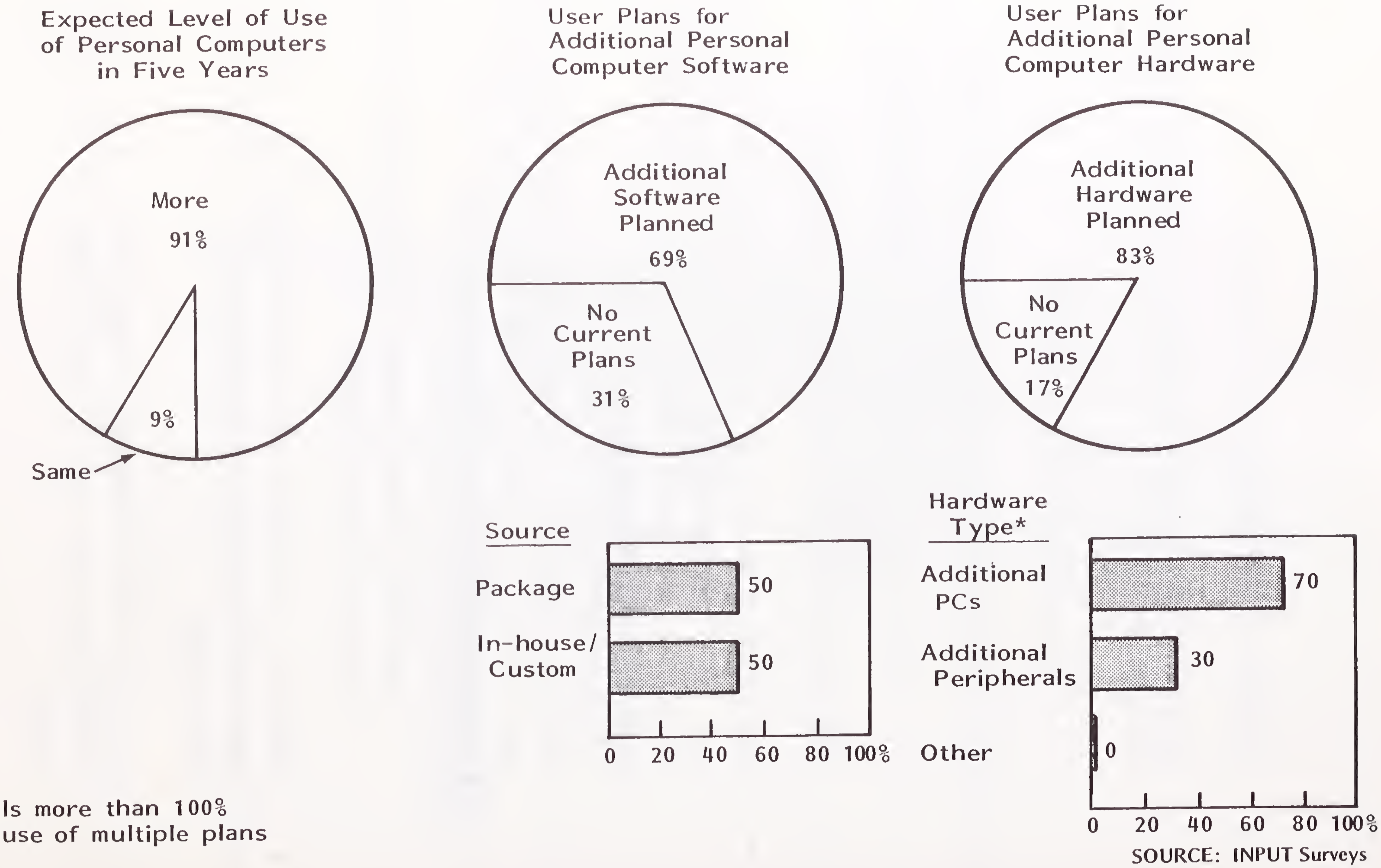
SOURCE: INPUT Surveys

4. PERSONAL COMPUTERS

- Plans for the use of personal computers in this sector are shown in Exhibit III-80 and include:
  - The overall level of use in five years.
  - Plans for obtaining additional personal computer software.
  - Plans for obtaining additional personal computer hardware.
- The utility sector's plans are in line with industry generally.
- Exhibit III-81 shows the types of personal computer software packages now used. "Calc, " word processing, languages/support system, and office support packages are used somewhat more than average. Other packages are used considerably less than average.
- The general categories of applications used are summarized in Exhibit III-82. Here the profile is much different than average with data base and word processing applications used much more than average.
  - Exhibit III-83 provides examples of actual personal computer applications in use in the utility sector.
- Compared to the average user, personal computer users in this sector are much more likely to rely on the IS department for assistance, as shown in Exhibit III-84.
- In this sector 63% of departments using personal computers have had their installation less than a year, as shown in Exhibit III-85, compared to 78% generally.

EXHIBIT III-80

PERSONAL COMPUTER ACQUISITION PLANS IN THE UTILITIES SECTOR

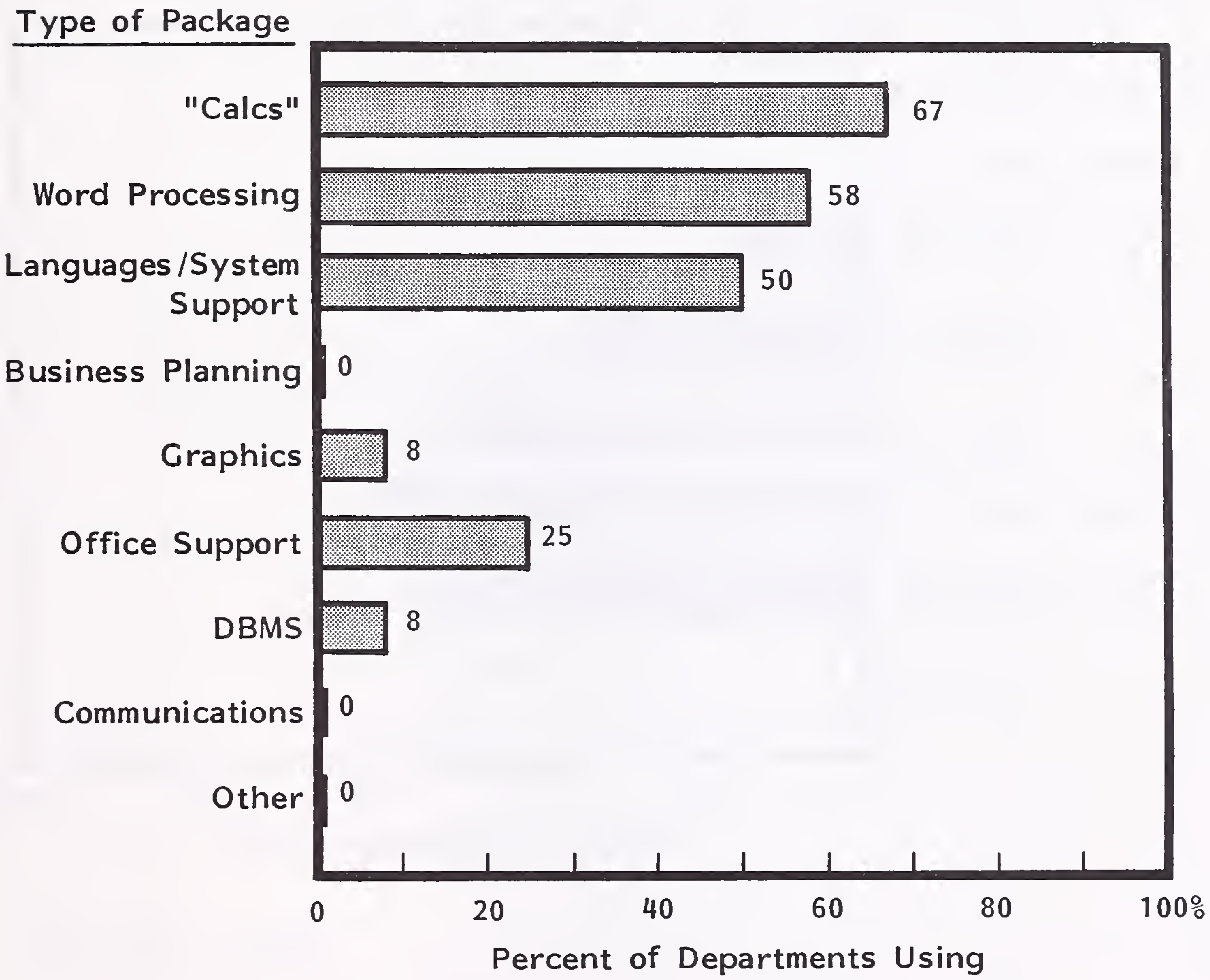


SOURCE: INPUT Surveys

* Totals more than 100% because of multiple plans

EXHIBIT III-81

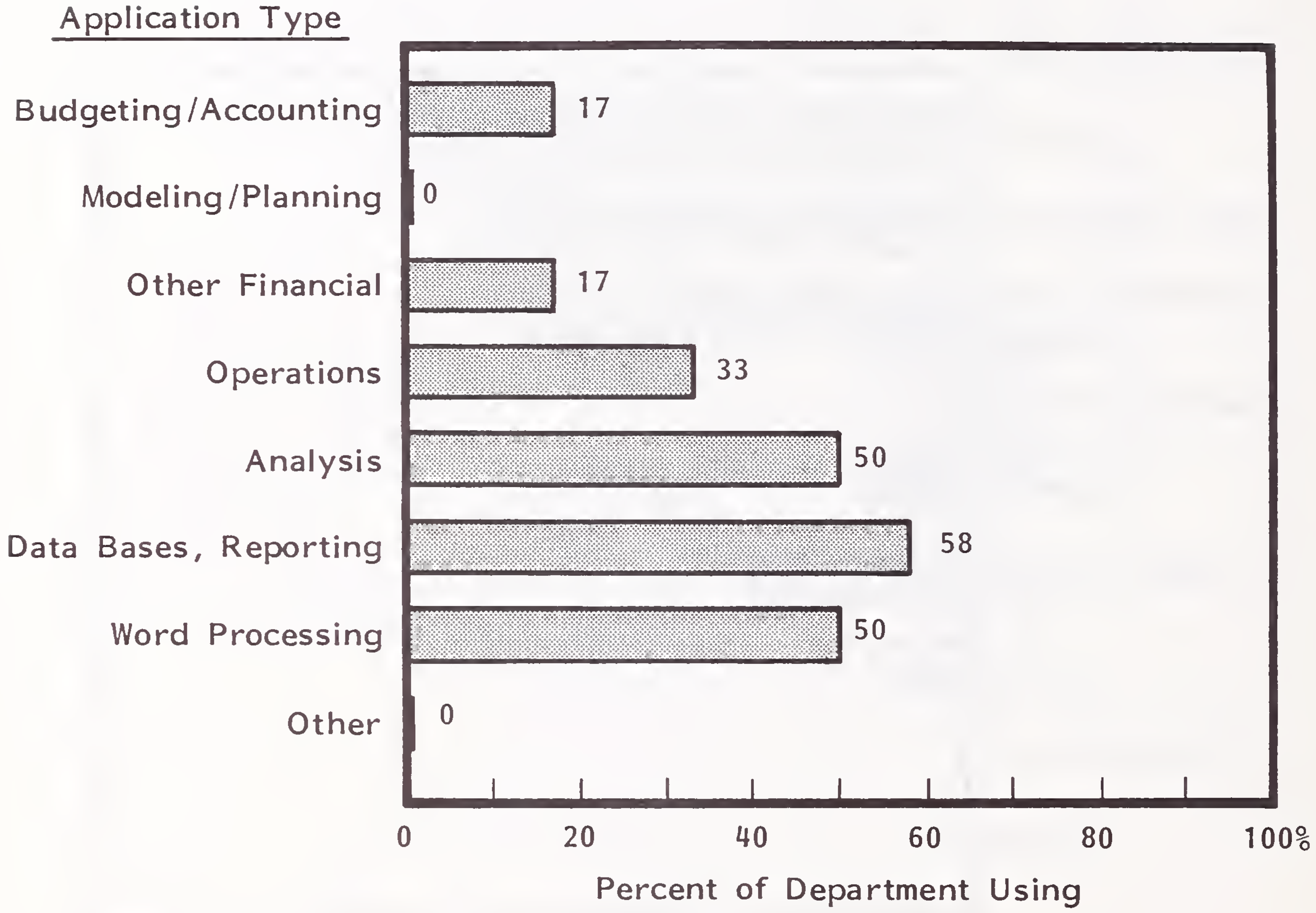
TYPES OF PERSONAL COMPUTER SOFTWARE PACKAGES USED IN THE UTILITIES SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-82

PERSONAL COMPUTER APPLICATIONS IN THE UTILITIES SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-83

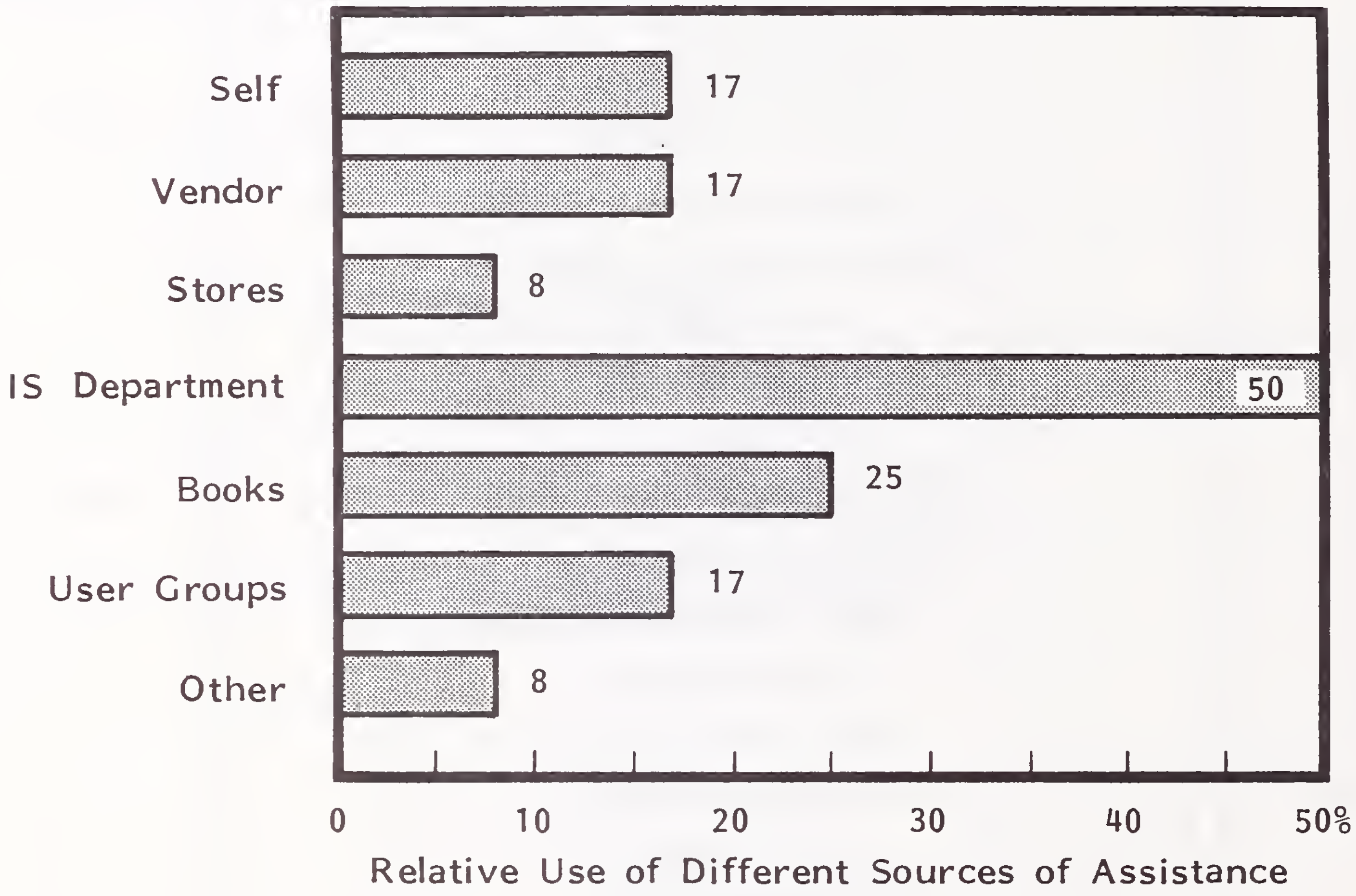
PERSONAL COMPUTER APPLICATIONS IN THE UTILITIES SECTOR

Fuel Analysis
Data Base
Word Processing
Library Updates
Railroad Profiles
Civil Engineering Analysis
Cost Reports
Spread Sheets
Filing
Historical Claims
Cash Administration
Financial Modeling
Debt Portfolio
Balancing Records
Software Review
Report Writing
Calculating
Rate Analysis

SOURCE: INPUT Surveys

EXHIBIT III-84

SOURCES OF ASSISTANCE FOR PERSONAL COMPUTER USERS IN THE UTILITIES SECTOR

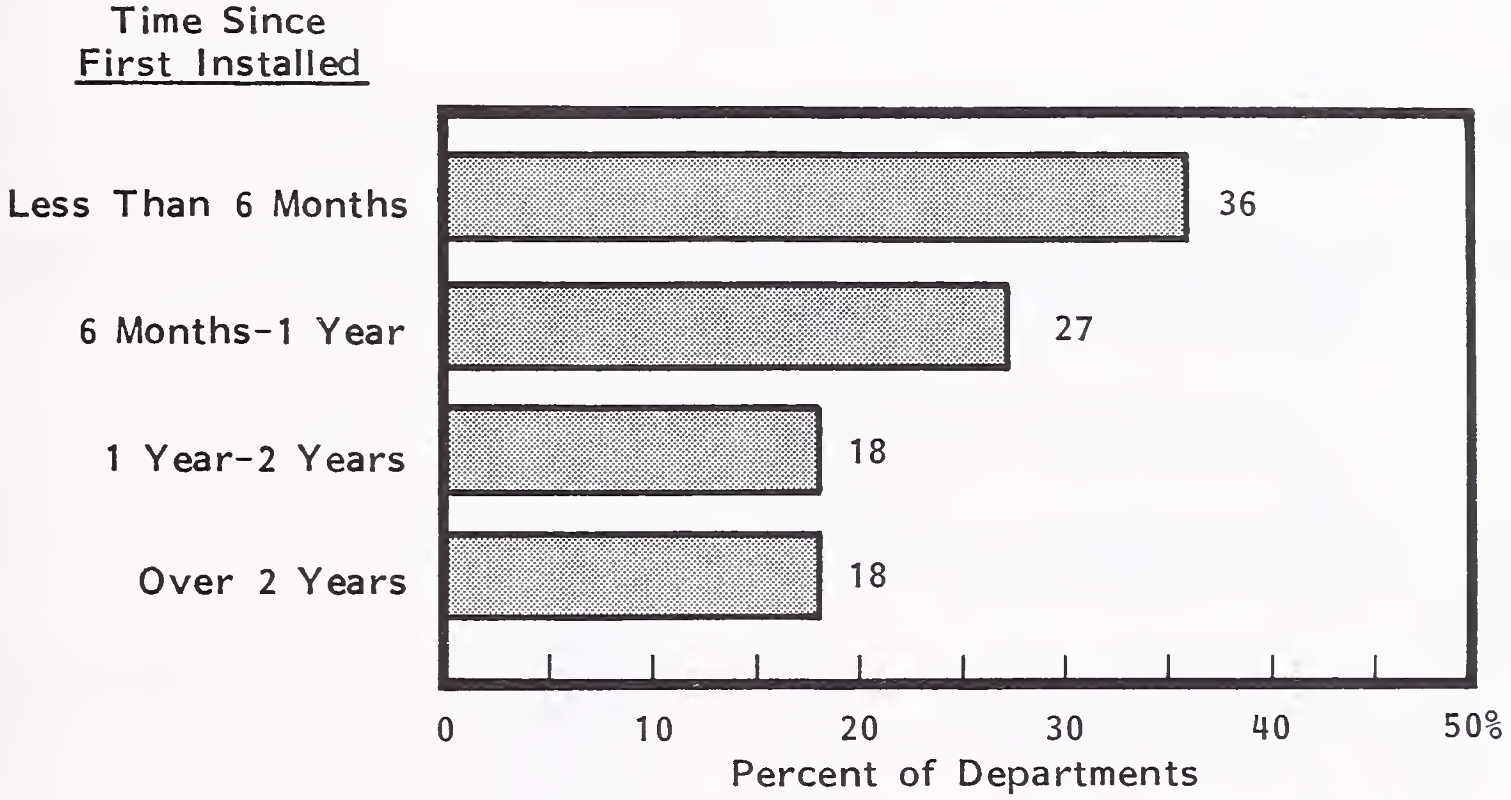


Note: Total Is More Than 100% Because of Multiple Sources.

SOURCE: INPUT Surveys

EXHIBIT III-85

TIME SINCE FIRST PERSONAL COMPUTER INSTALLED IN USER DEPARTMENTS IN THE UTILITIES SECTOR



SOURCE: INPUT Surveys

F. BANKING AND FINANCE SECTOR

1. BUDGETS

- In this sector 100% of the organizations expect budget increases in 1983, compared to 61% generally; none expects a decrease compared to 8% generally, as shown in Exhibit III-86. Respondents foresee an average rise of 15%.

- The budget increases expected do not vary by organization size.

- The average budget growth expected for 1983 in the banking and finance sector is 15%, compared to 17% in 1982.

  - This represents a decline of 14% in the average rate of growth.

- The 1982 IS budget distribution is shown in Exhibit III-87.

  - Significant increases are expected in all categories except mainframes and processing services.

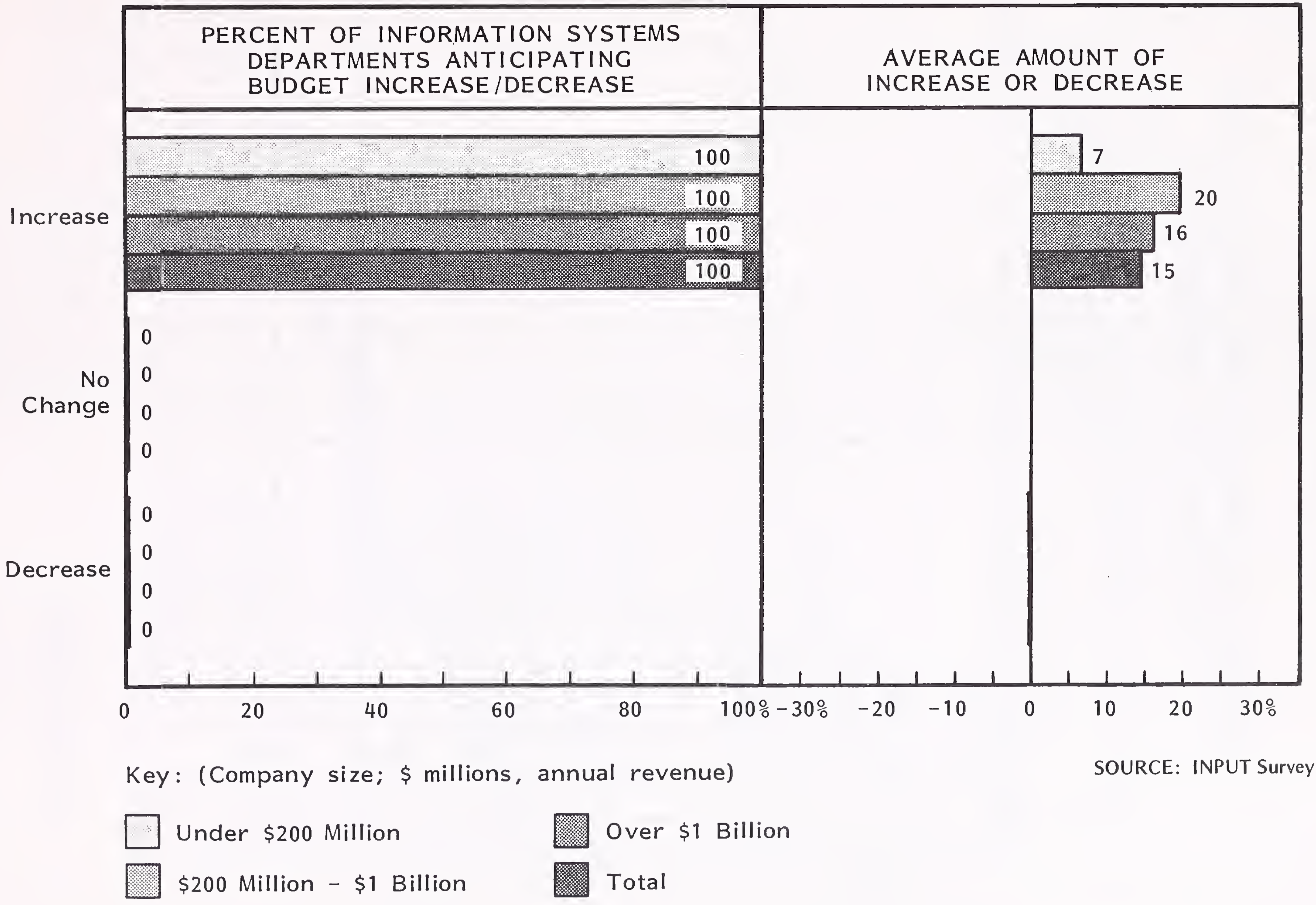
- Exhibit III-88 shows the range of the ratios between the IS budget and the unit's total assets which exist in the banking and finance sector.

  - The IS percentage of total assets for the average company (i.e., at the 50th percentile) in each size group was:

    - For large companies: 0.2%, compared to 0.65% for companies with equivalent revenues.

EXHIBIT III-86

ANTICIPATED BUDGET INCREASES FOR 1983 IN THE BANKING AND FINANCE SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-87

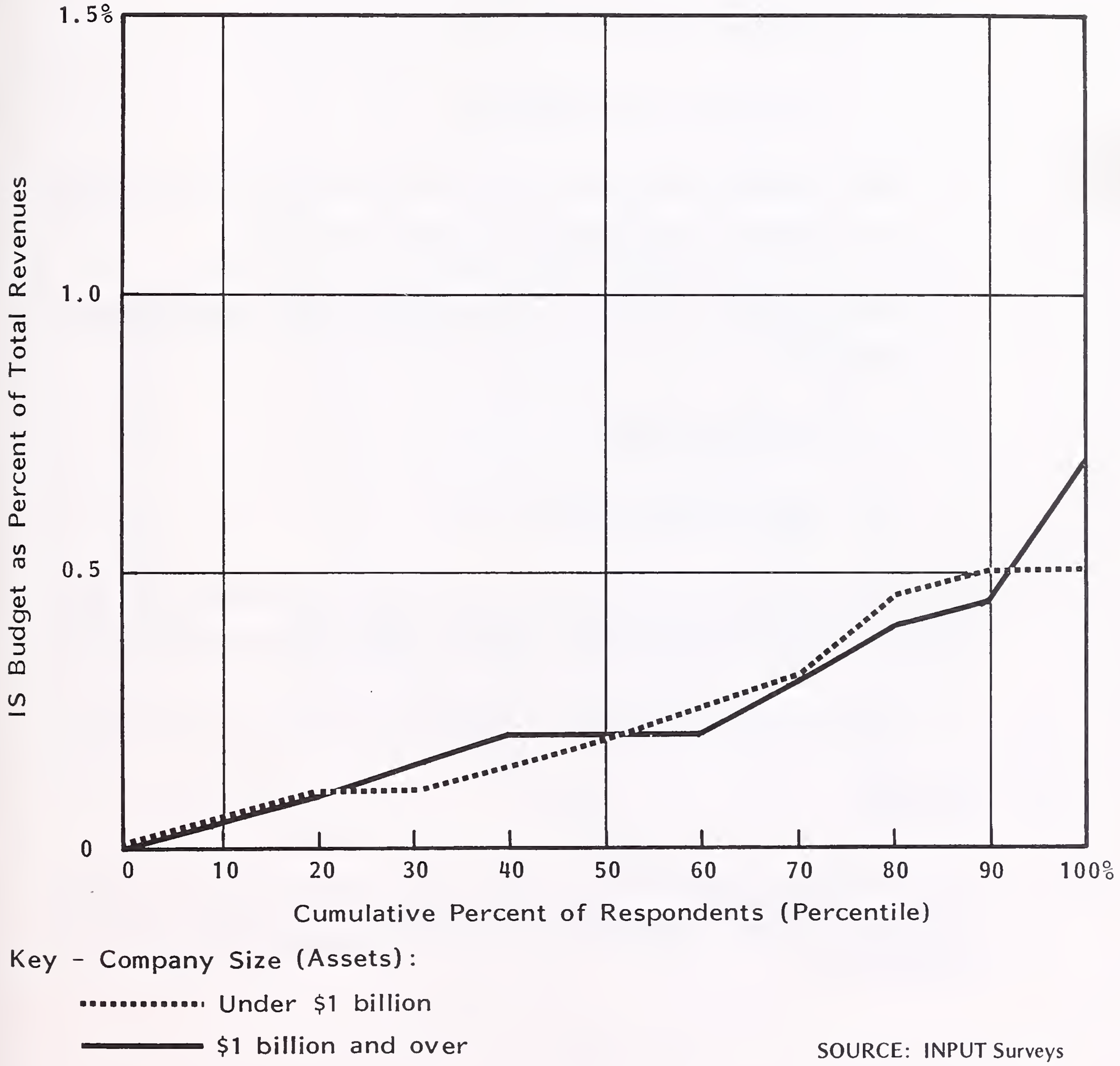
1982 BUDGET DISTRIBUTION AND 1982/1983 CHANGES IN THE BANKING AND FINANCE SECTOR

BUDGET CATEGORY	PERCENT OF IS BUDGET (1982)	EXPECTED CHANGE 1982 to 1983
Personnel	43%	13%
Hardware		
Mainframe	15	7
Mini/Microcomputer	1	15
Terminals	3	24
Peripherals	6	17
Communications	5	33
Software and Services		
Software	2	28
Processing Services	2	-28
Software Maintenance	3	19
Hardware Maintenance	4	18
Other	16	15
Total	100%	15%

SOURCE: INPUT Surveys

EXHIBIT III-88

INFORMATION SYSTEMS BUDGET AS A PERCENT OF TOTAL ASSETS IN THE BANKING AND FINANCE SECTOR



SOURCE: INPUT Surveys

    - For medium and small units: 0.2%, compared to approximately 1.0% for companies with equivalent revenues.

  - The organizations that spend least on data processing as a percentage of revenues are those at and below the 20th percentile. Taking the 10th percentile as representative, their IS spending percentages were:

    - Large units: 0.1%.

    - Medium and small units: 0.1%.

  - The companies that spend the most on data processing as a percentage of revenues are those at and above the 80th percentile.

  - Taking the 90th percentile as representative, their IS spending percentages were:

    - Large units: 0.5%.

    - Medium and small units: 0.5%.

- Median spending on IS per corporate employee was $3,400. However, there was a broad range of spending ratios, as shown in the diagram in Exhibit III-89.

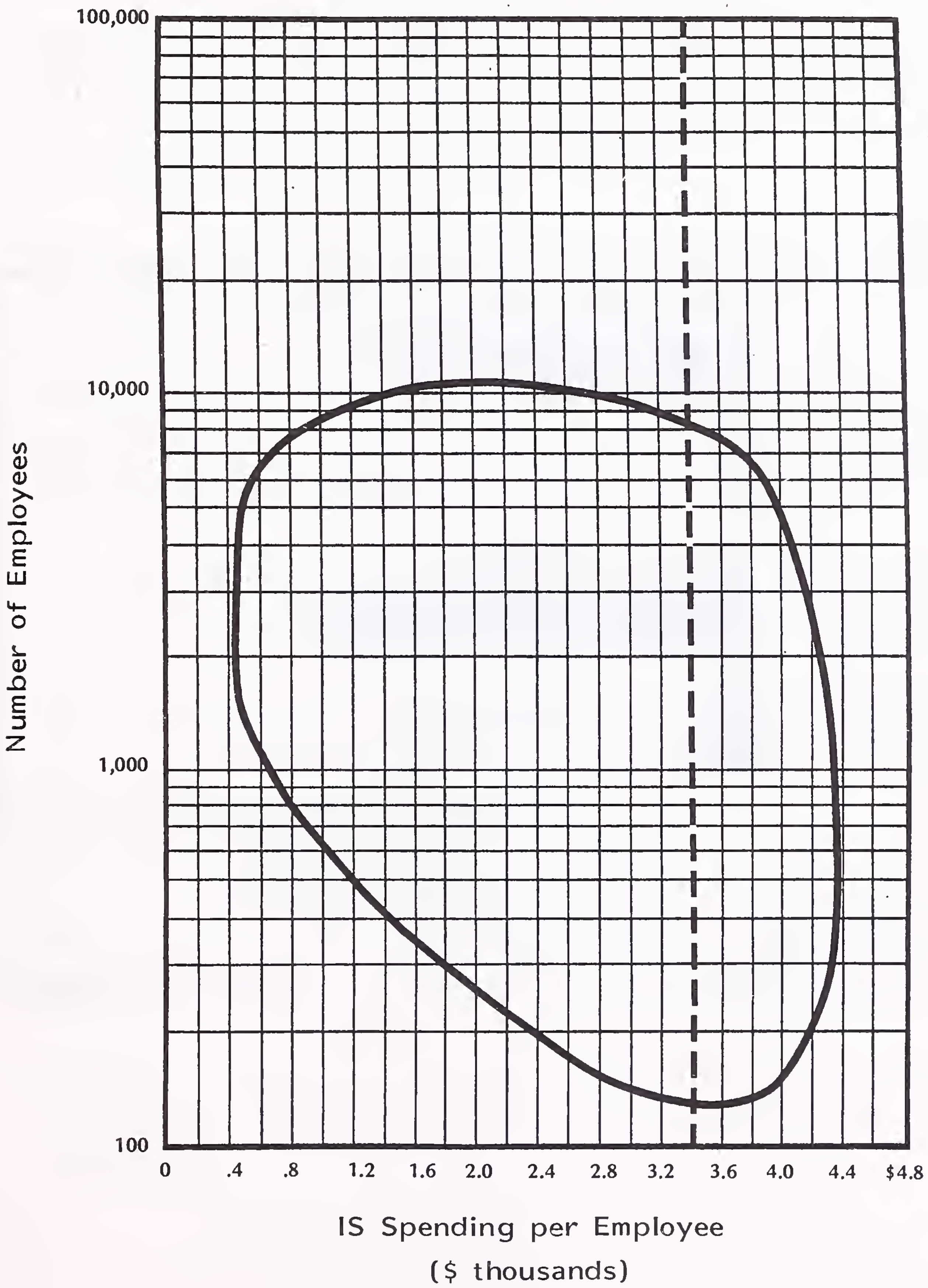
  - The reasons for this variation were discussed in Chapter II, Section B.

2. STAFFING

- In the staffing sector 47% of organizations expect their IS staffs to increase in the next 12 months, compared to the industry average of 58%, as shown in Exhibit III-90.

EXHIBIT III-89

INFORMATION SYSTEMS SPENDING PER EMPLOYEE BY COMPANY SIZE IN THE BANKING AND FINANCE SECTOR

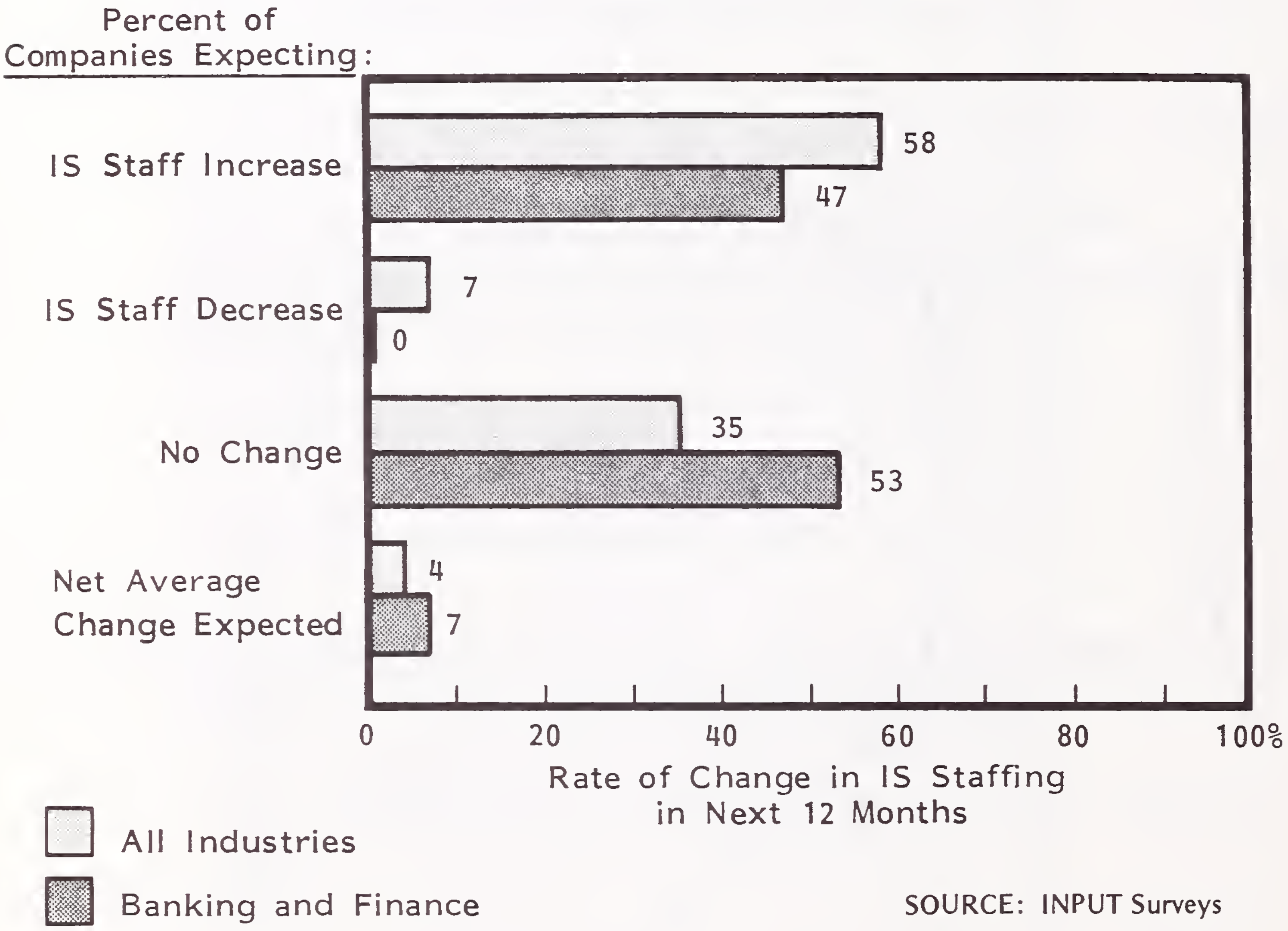


— — — — = Median

SOURCE: INPUT Surveys

EXHIBIT III-90

INFORMATION SYSTEMS STAFFING CHANGES EXPECTED IN THE NEXT TWELVE MONTHS IN THE BANKING AND FINANCE SECTOR



SOURCE: INPUT Surveys

  - The net increase in number of staff is expected to be 7%, compared to the all-industry average of 4%.

- Turnover in this sector is expected to be 50% more than the all-industry average in 1983, as shown in Exhibit II-9.

  - Current turnover rates for individual positions are shown in Exhibit III-91. For technical positions turnover is appreciably greater than average.

- Difficulty in recruiting staff in this sector is considered to be relatively high and is somewhat above all-industry averages, as shown in Exhibit III-92.

- The number of programs to be maintained averages 800 in this sector, although the range, both in absolute numbers and based on company size, is quite broad, as shown in Exhibit III-93.

  - Maintenance, as a proportion of total workload, is greater than that for most sectors and has increased somewhat, as shown in Exhibit III-94.

  - Company size does not generally have a significant impact on the maintenance proportion, as shown in Exhibit III-95.

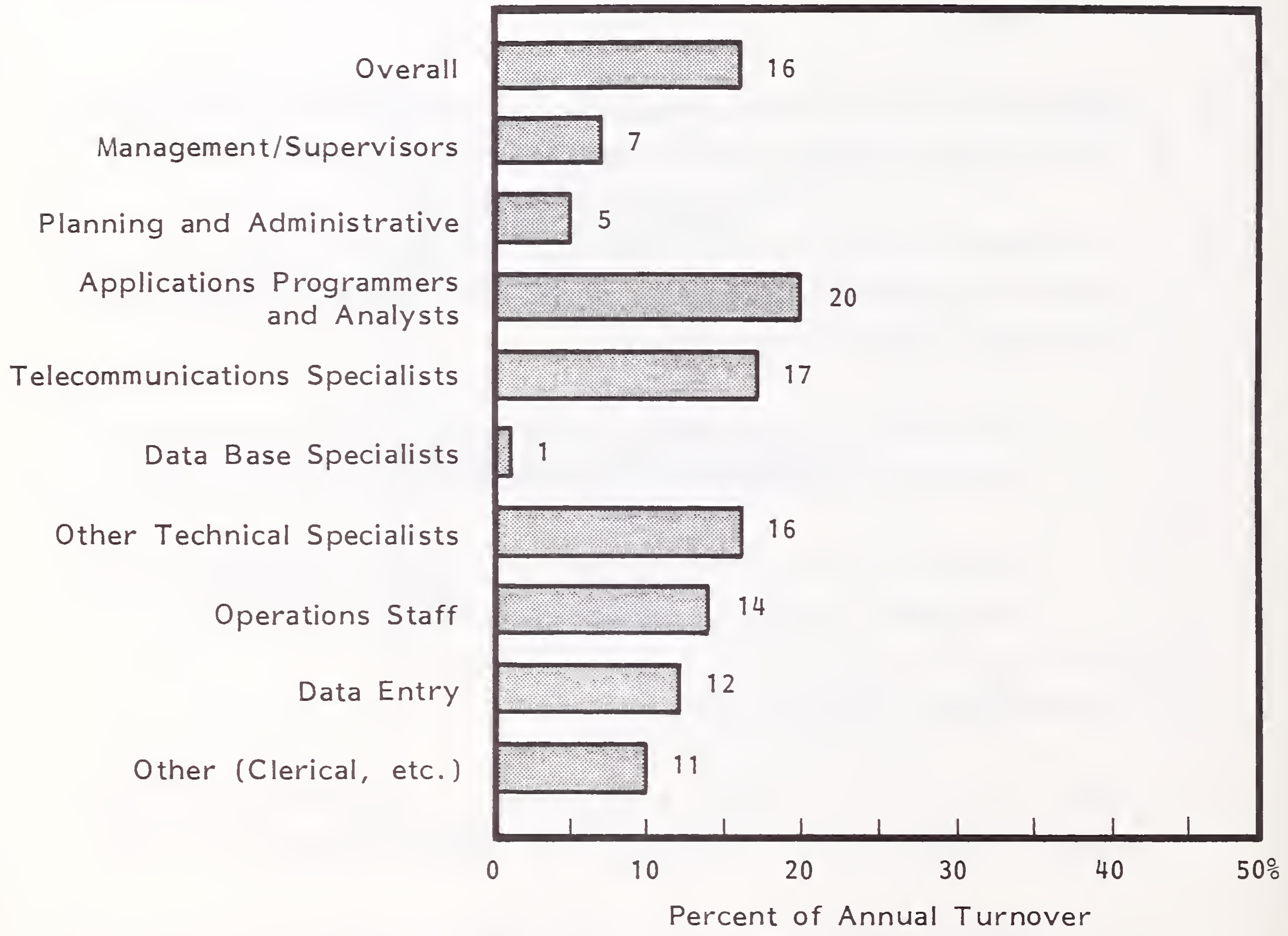
3. INFORMATION SYSTEMS ISSUES

- Note: please refer to Chapter II, Section D for a general discussion of IS problems, objectives, and initiatives and their interrelationships.

- The banking and finance sector sees itself with significantly more problems than average in hardware, software, and planning and control, as shown in Exhibit III-96.

EXHIBIT III-91

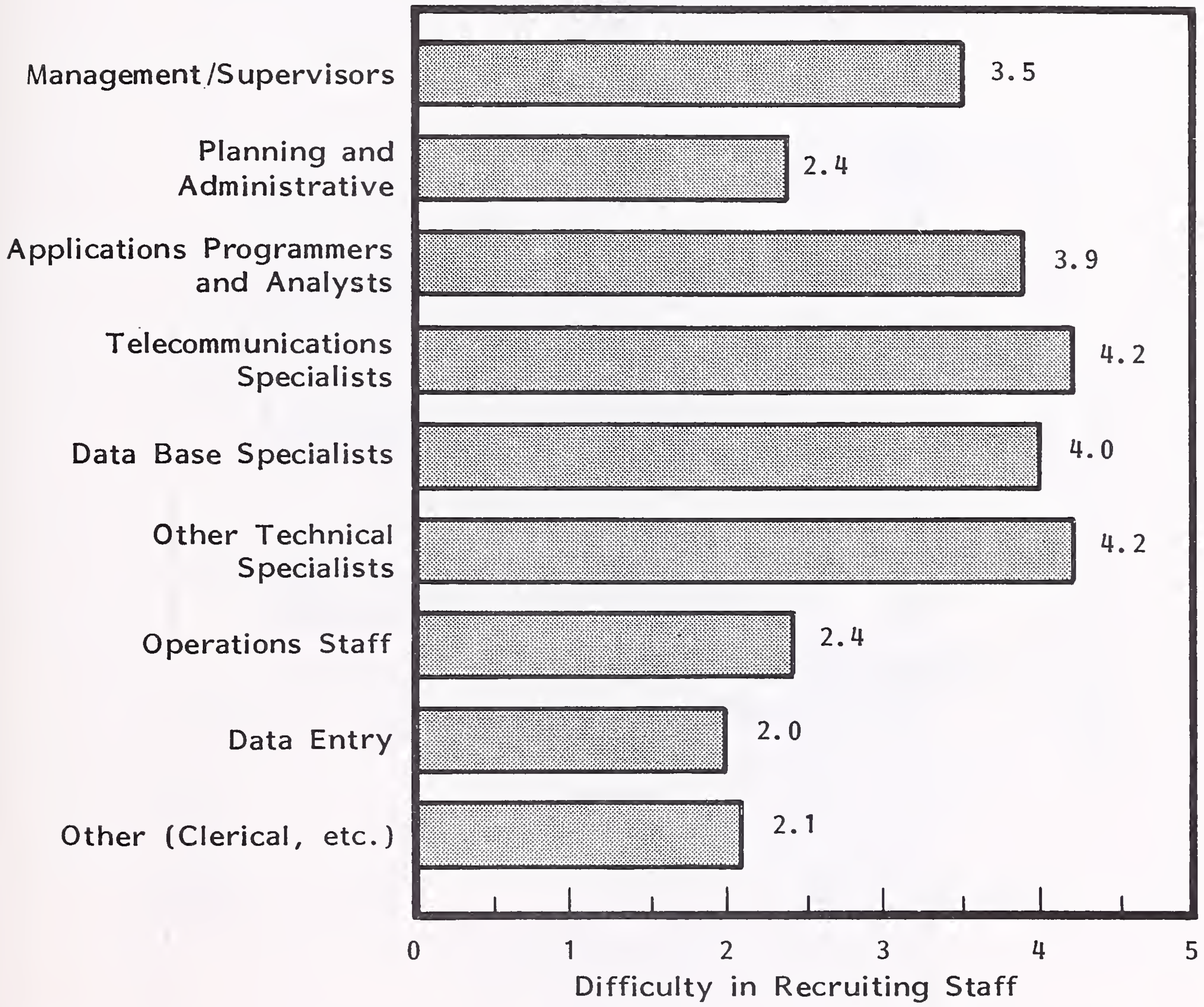
CURRENT ANNUAL TURNOVER IN THE BANKING AND FINANCE SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-92

INFORMATION SYSTEMS DIFFICULTY IN RECRUITING STAFF IN THE BANKING AND FINANCE SECTOR

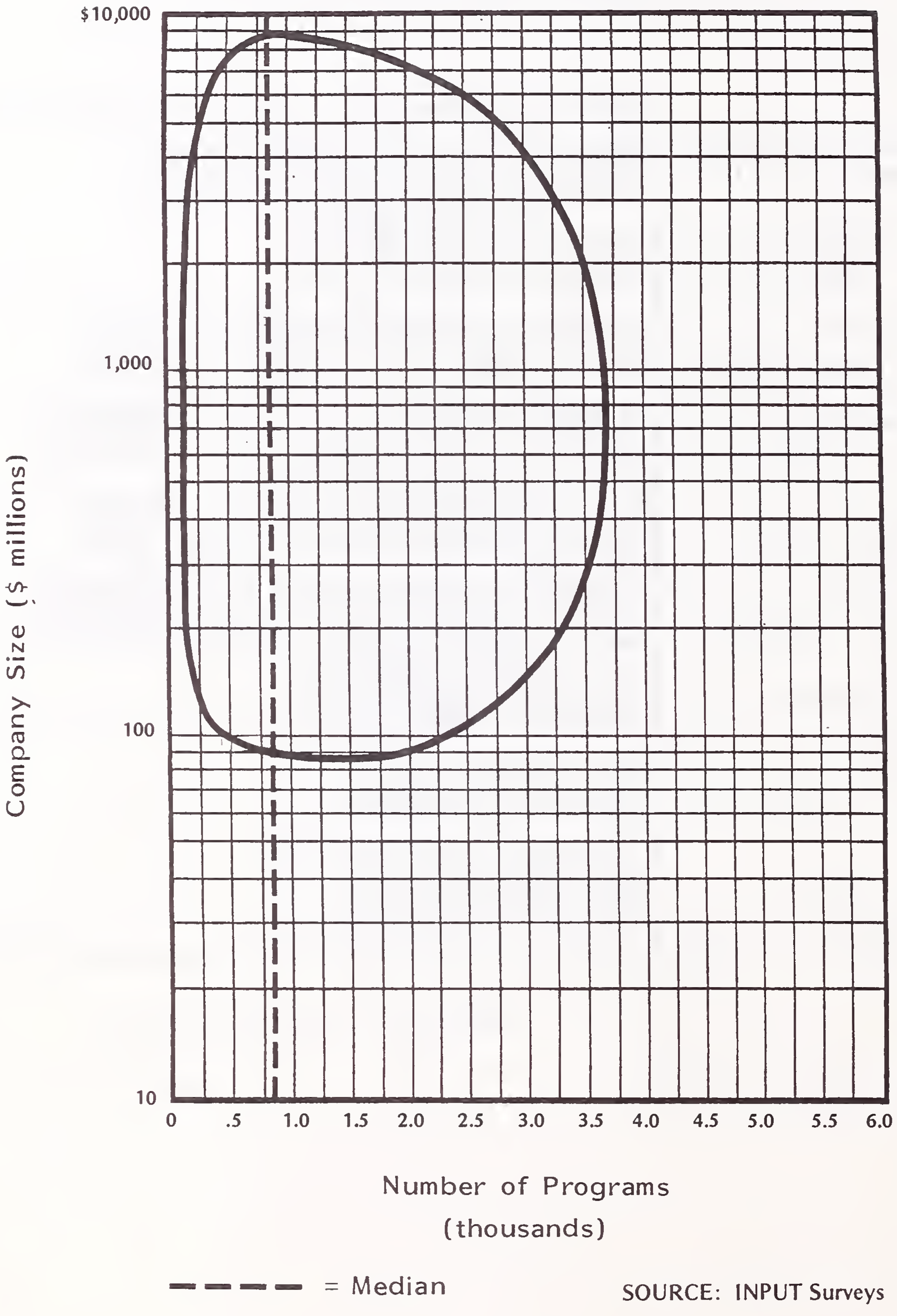


Scale: 1 = Low, 5 = High

SOURCE: INPUT Surveys

EXHIBIT III-93

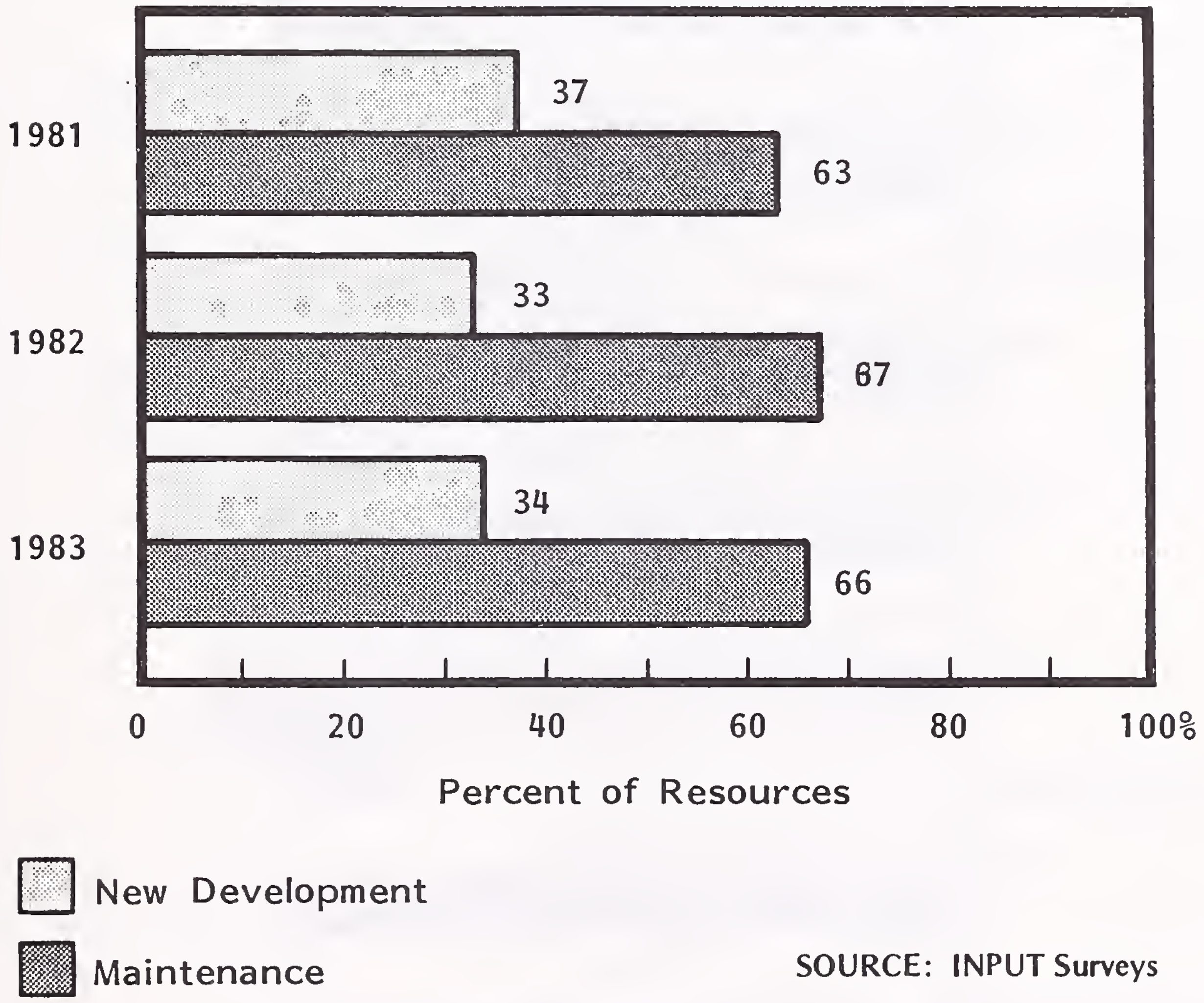
NUMBER OF PROGRAMS BY COMPANY SIZE IN THE BANKING AND FINANCE SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-94

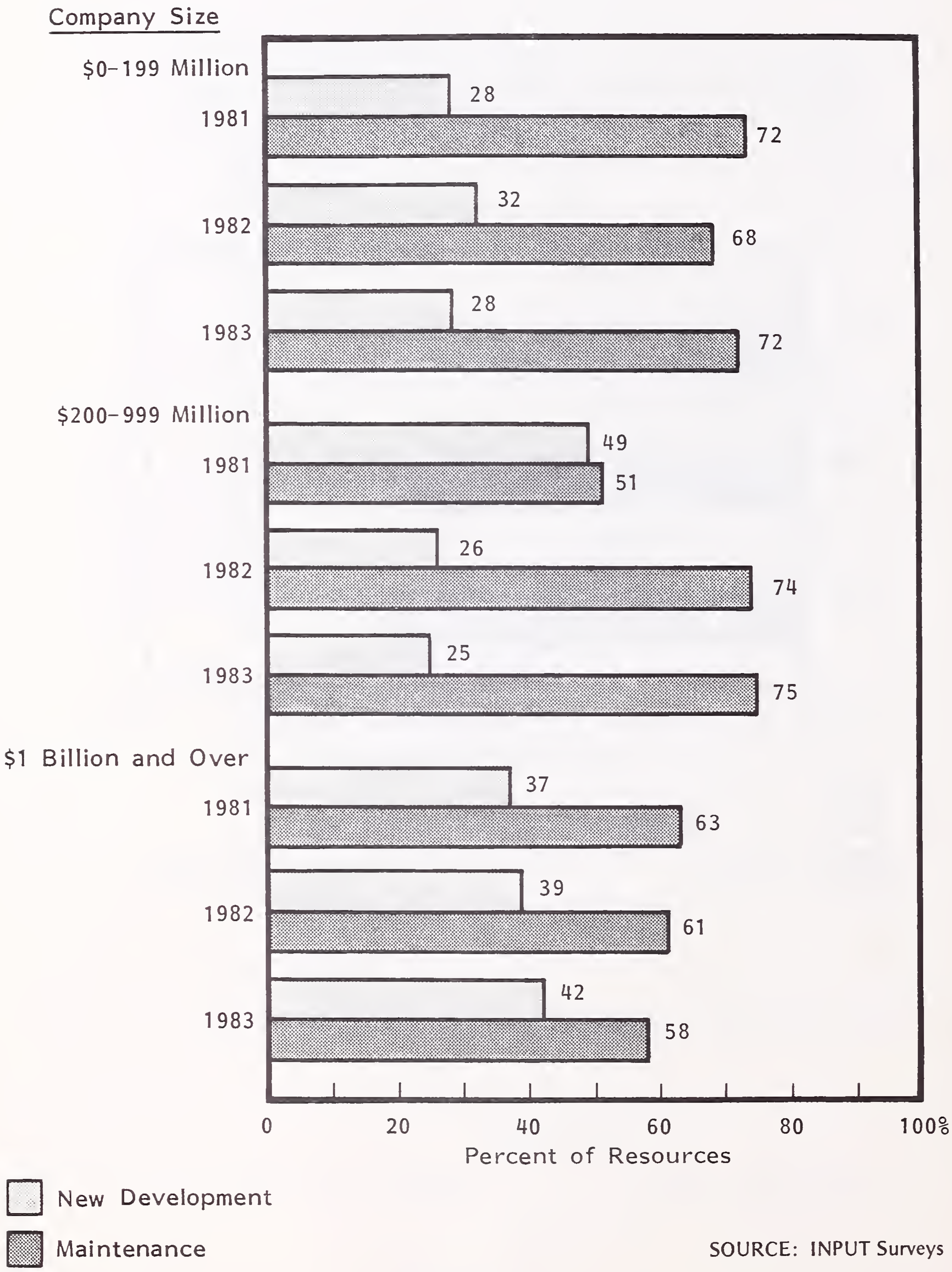
NEW PROGRAM DEVELOPMENT VERSUS MAINTENANCE IN THE BANKING AND FINANCE SECTOR, 1981-1983



SOURCE: INPUT Surveys

EXHIBIT III-95

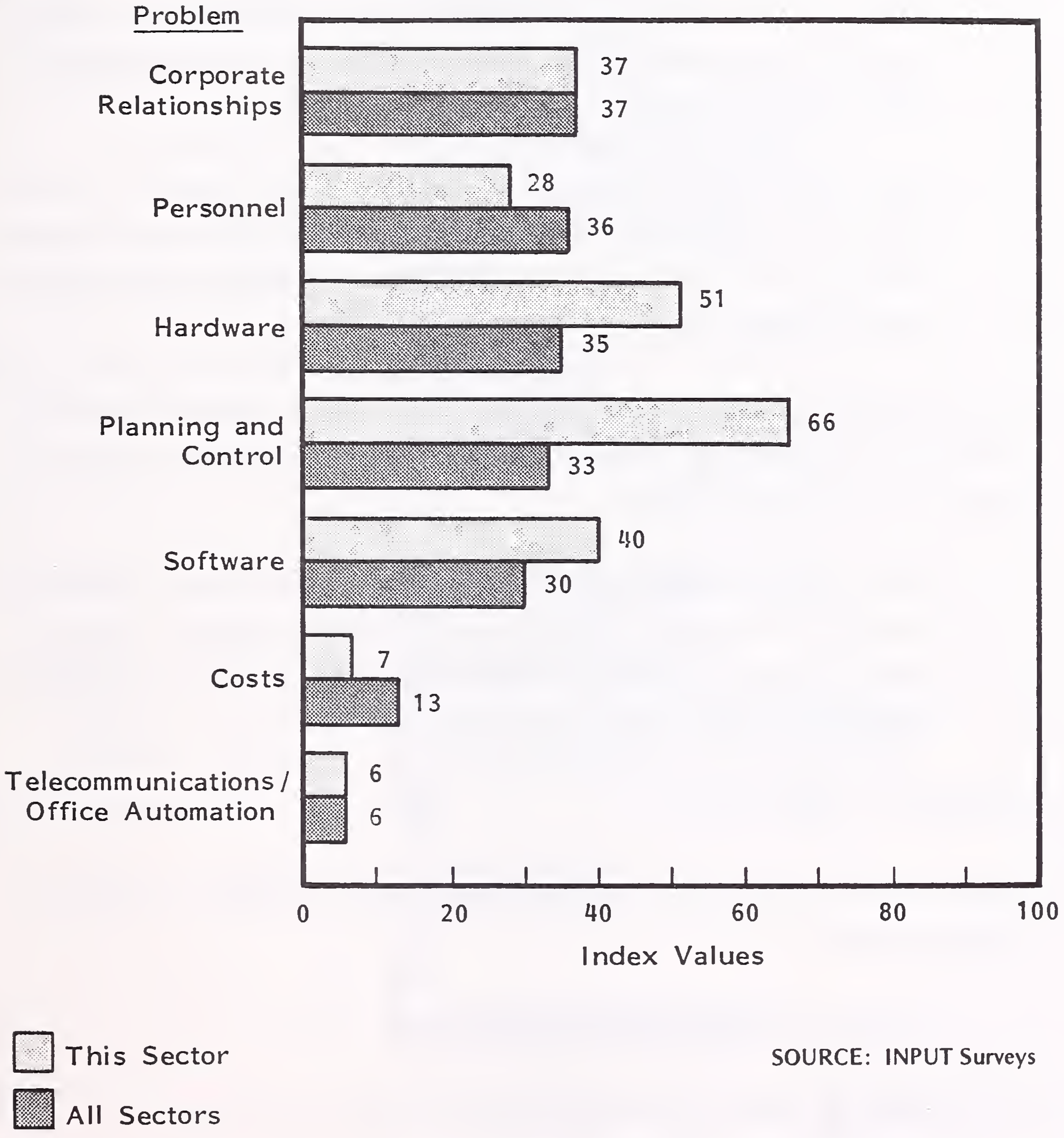
NEW PROGRAM DEVELOPMENT VERSUS MAINTENANCE IN THE BANKING AND FINANCE SECTOR, 1981-1983



SOURCE: INPUT Surveys

EXHIBIT III-96

INFORMATION SYSTEMS PROBLEMS IN THE BANKING AND FINANCE SECTOR



SOURCE: INPUT Surveys

  - More detailed information about specific problem areas is contained in Exhibit III-97. This exhibit shows the percentage of companies in this sector which regard an issue as a major problem.

- Software and planning and control are also areas where banking and finance organizations have major goals, as shown in Exhibit III-98.

  - Note also that cost control is more important for banking and finance than any other sector. This is directly related to the cost squeeze that many financial institutions have experienced in 1982.

  - More detailed information about specific planning objectives is contained in Exhibit III-99. This exhibit shows the percentage of companies in this sector which have identified particular planning objectives as being of major importance to them.

- As can be see in Exhibit III-100, this sector is stressing software initiatives. Initiatives for improving corporate relationships are much more important here than in most other sectors.

  - More detailed information about specific areas where an initiative is planned is contained in Exhibit III-101. This exhibit shows the percentage of companies in this sector planning a major initiative in a particular area.

4. PERSONAL COMPUTERS

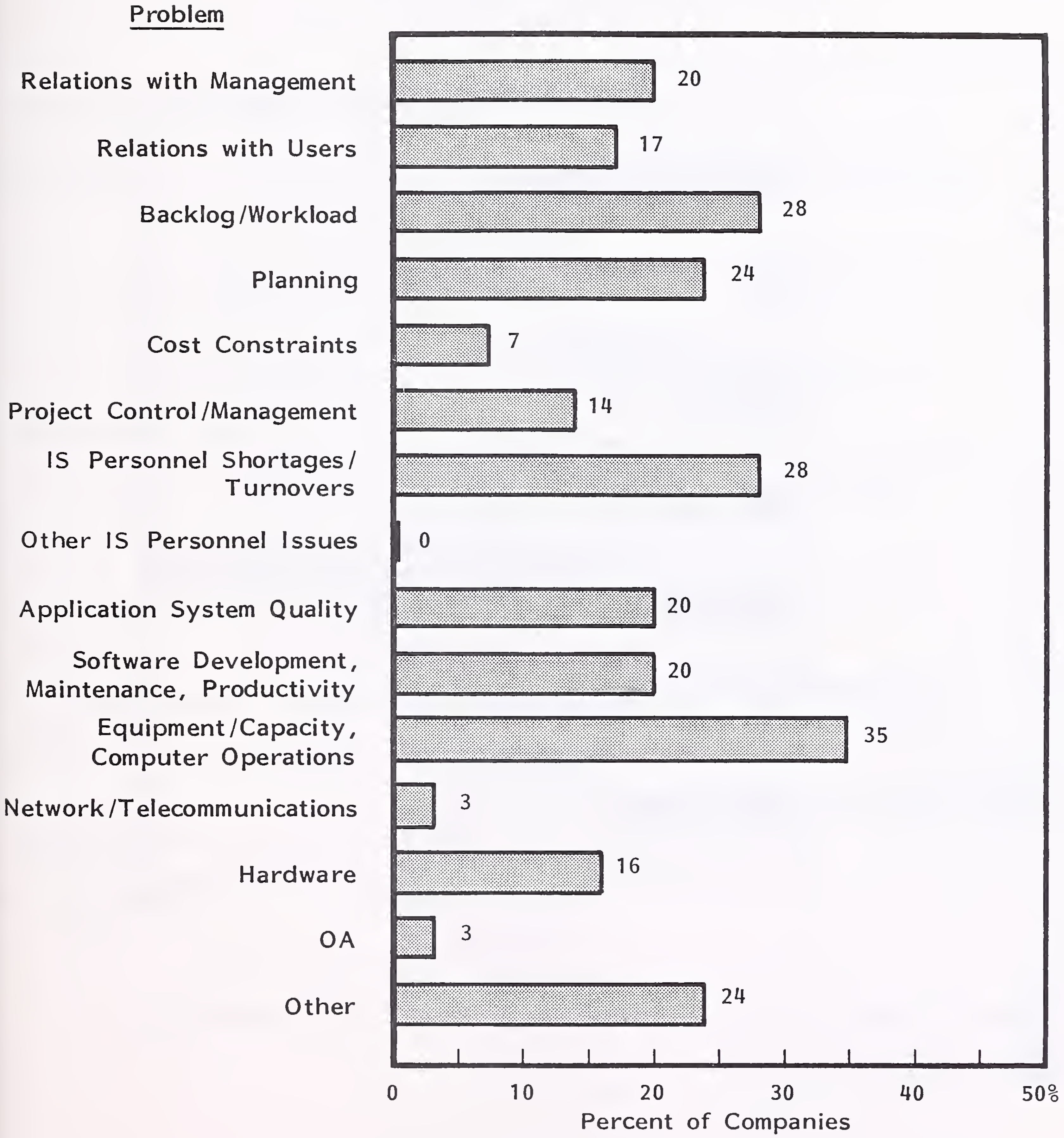
- Plans for the use of personal computers in this sector are shown in Exhibit III-102 and include:

  - The overall level of use in five years.

  - Plans for obtaining additional personal computer software.

EXHIBIT III-97

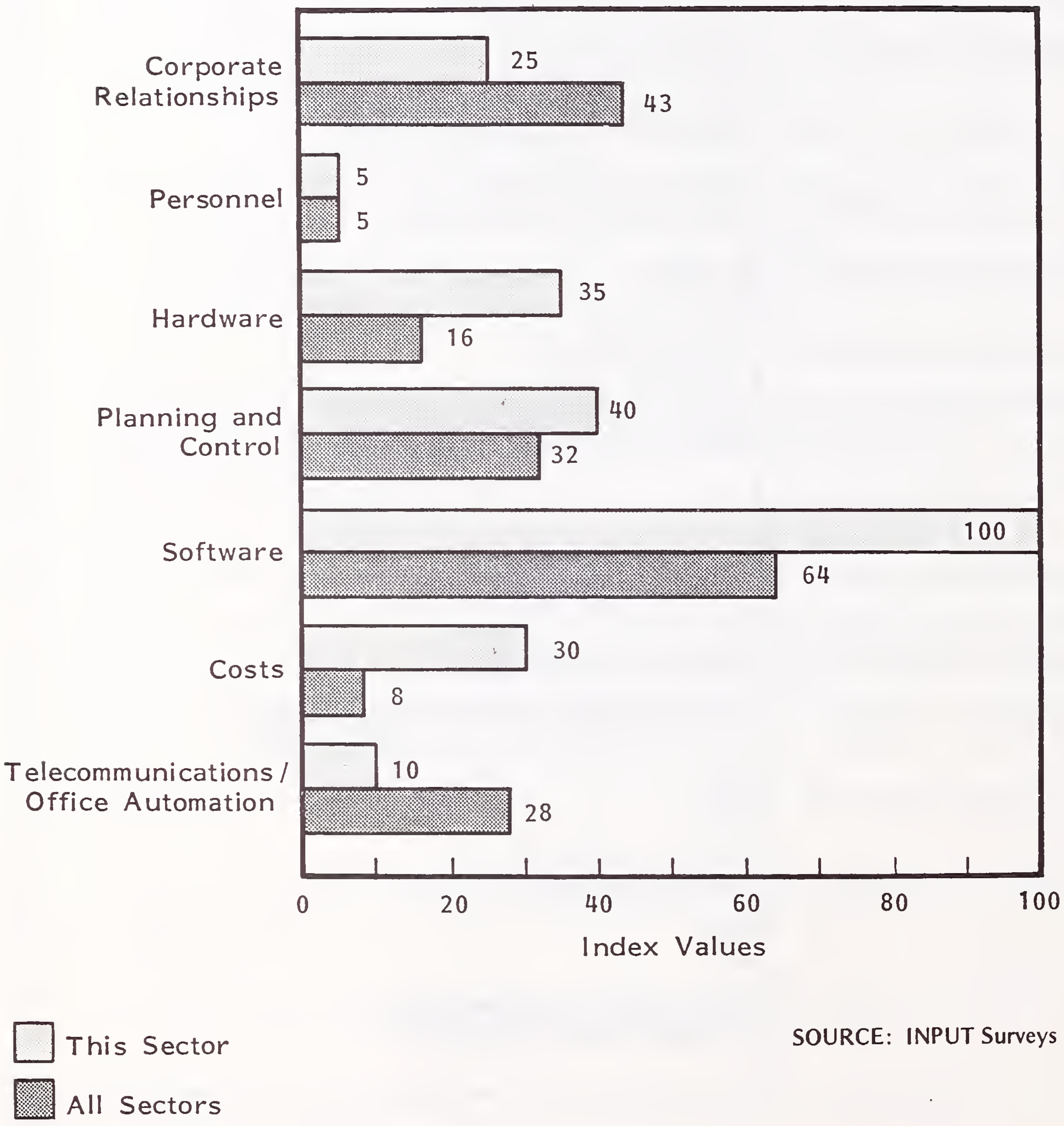
INFORMATION SYSTEMS PROBLEMS IN THE BANKING AND FINANCE SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-98

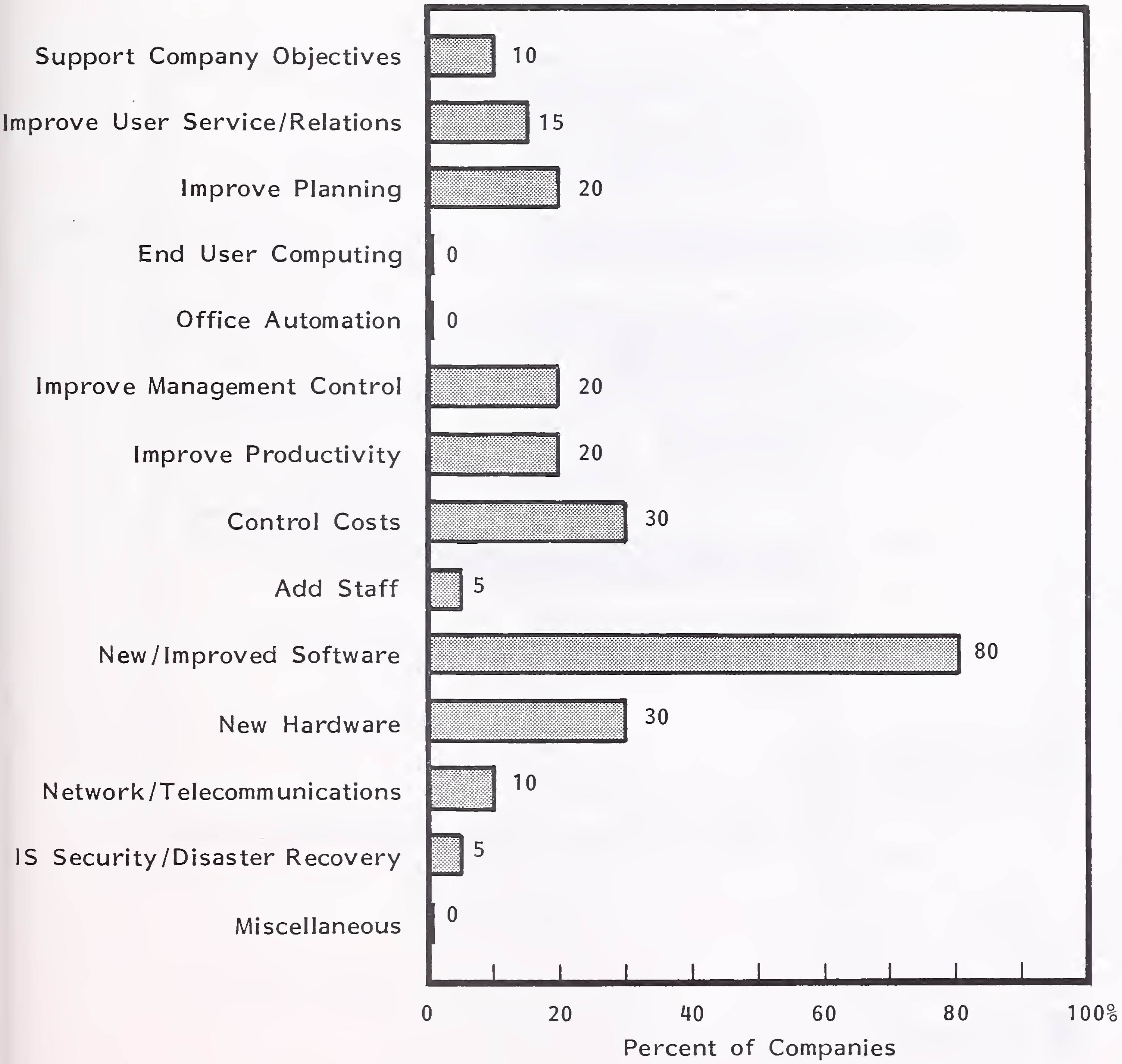
INFORMATION SYSTEMS OBJECTIVES IN THE BANKING AND FINANCE SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-99

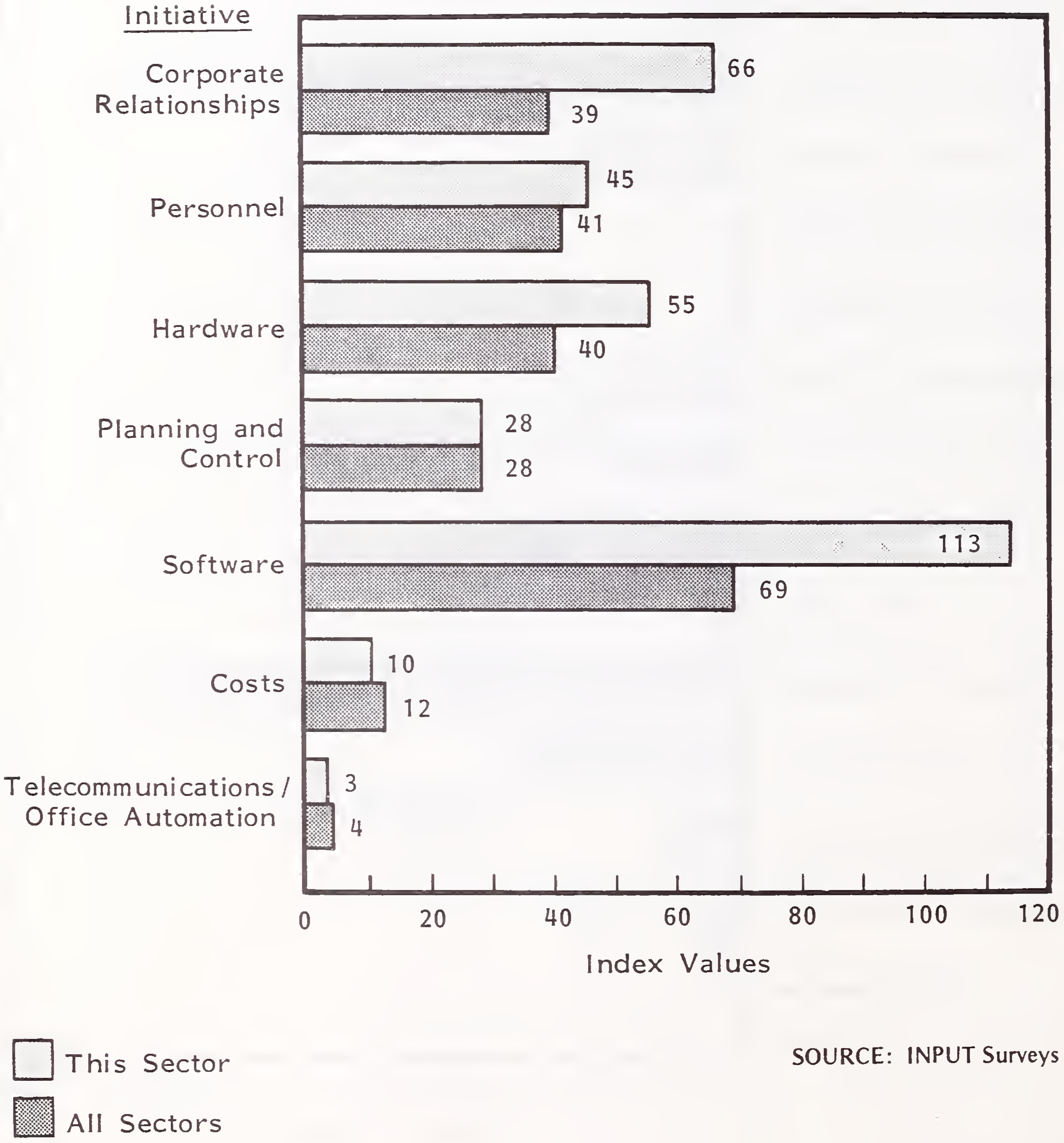
INFORMATION SYSTEMS OBJECTIVES IN THE BANKING AND FINANCE SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-100

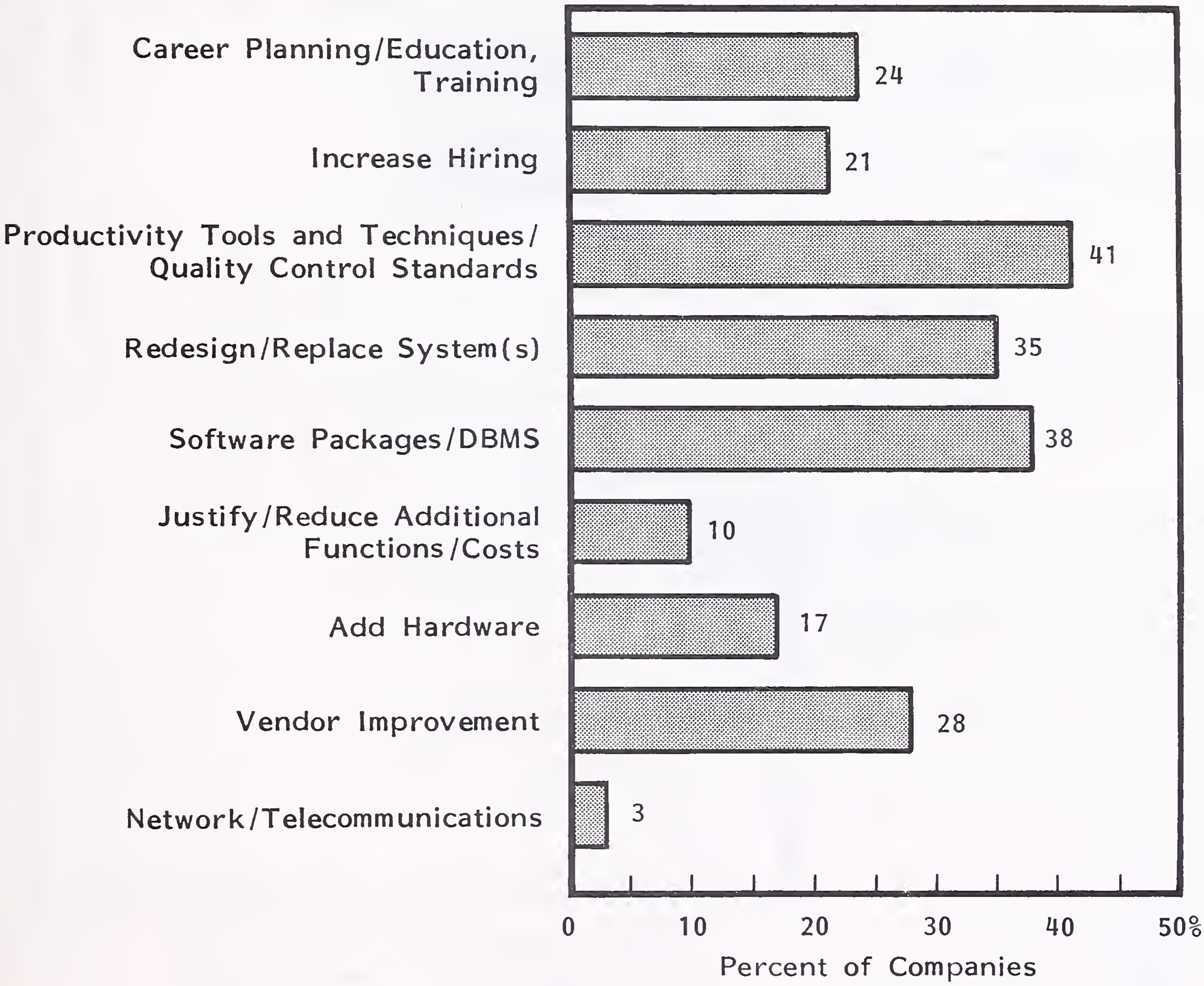
INFORMATION SYSTEMS INITIATIVES IN THE BANKING AND FINANCE SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-101

INFORMATION SYSTEMS INITIATIVES PLANNED IN THE BANKING AND FINANCE SECTOR

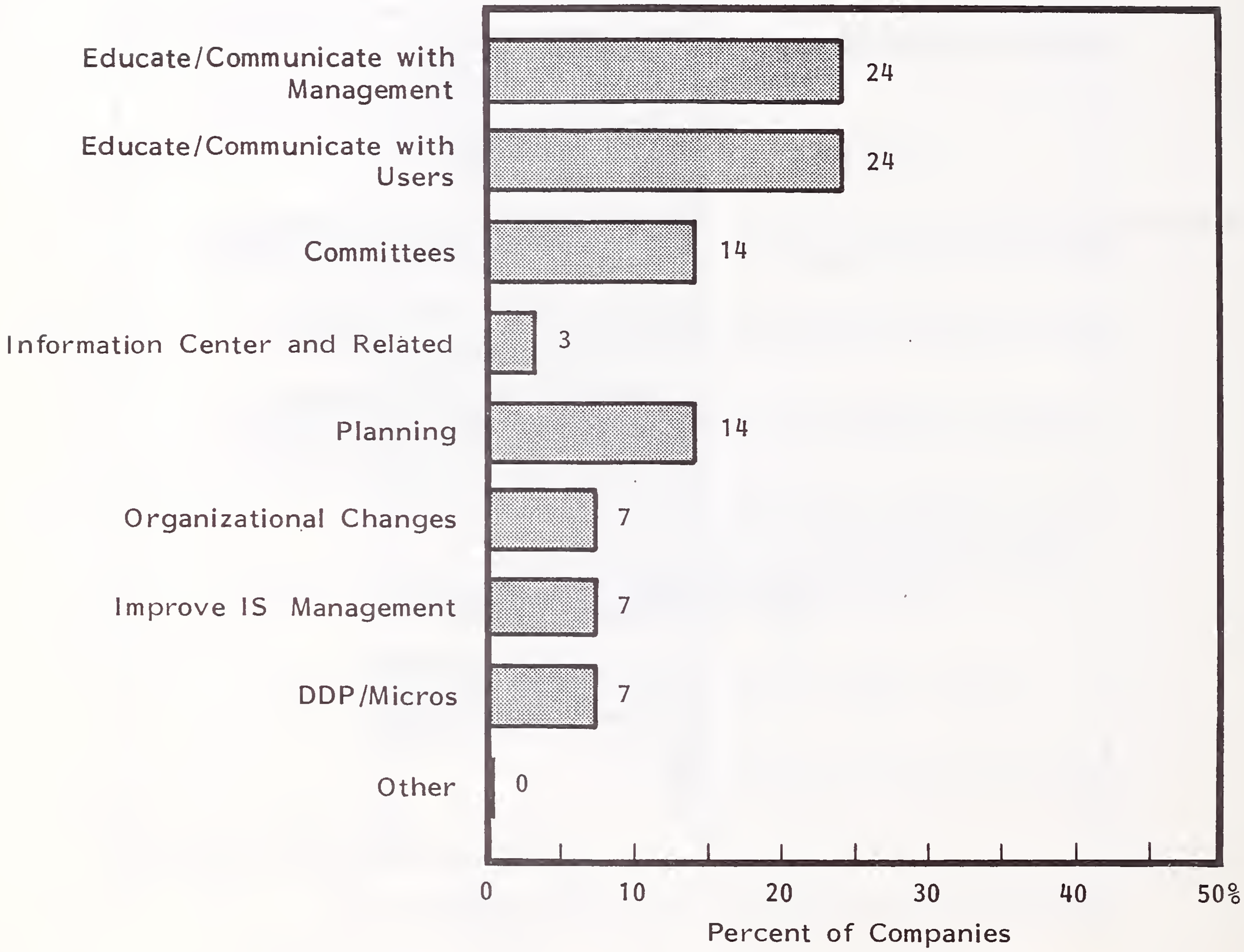


Continued

SOURCE: INPUT Surveys

EXHIBIT III-101 (Cont.)

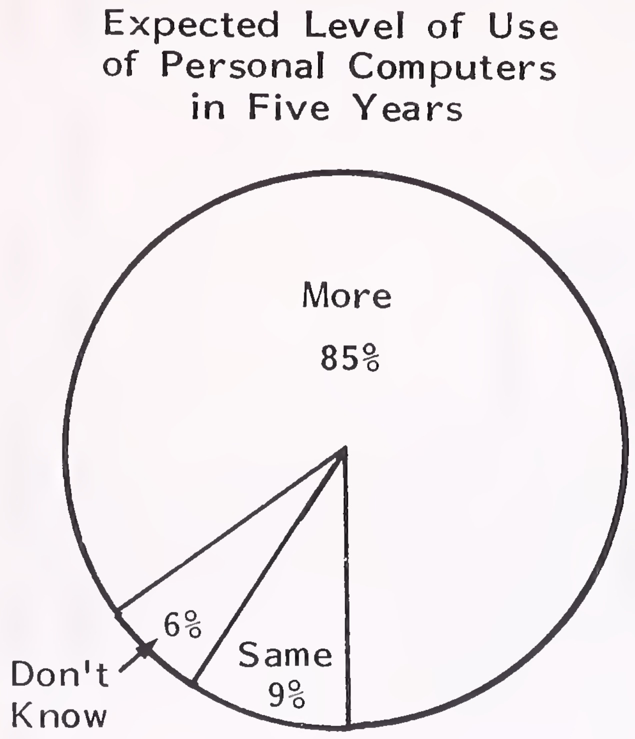
INFORMATION SYSTEMS INITIATIVES PLANNED IN THE BANKING AND FINANCE SECTOR

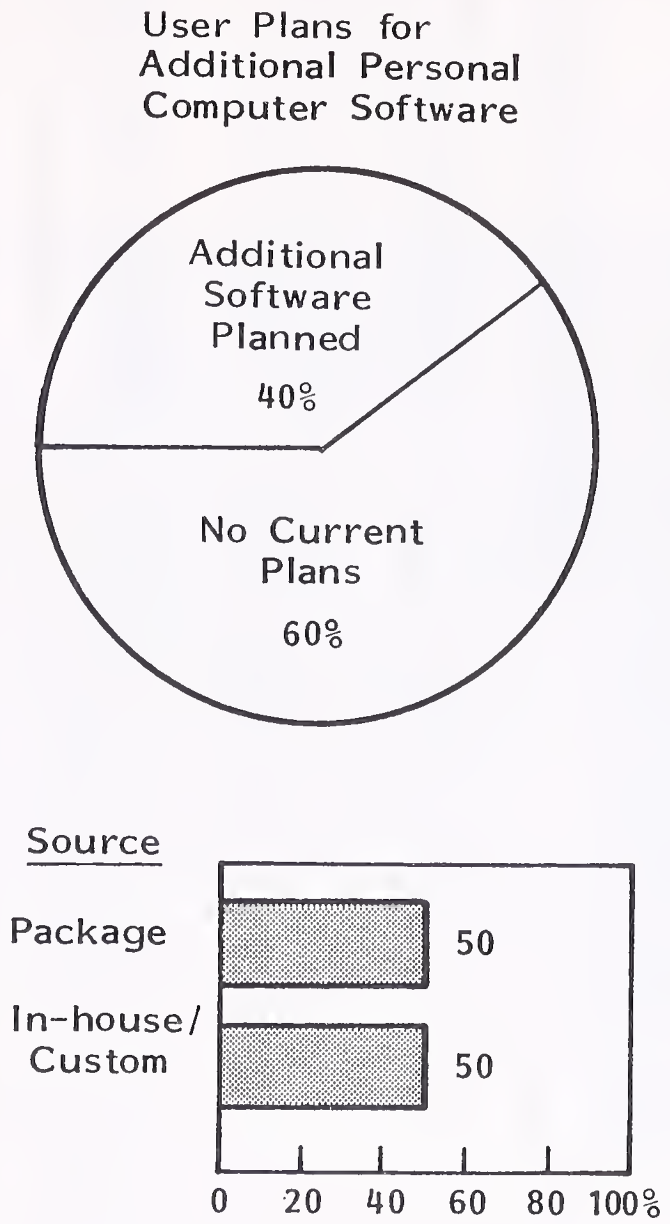


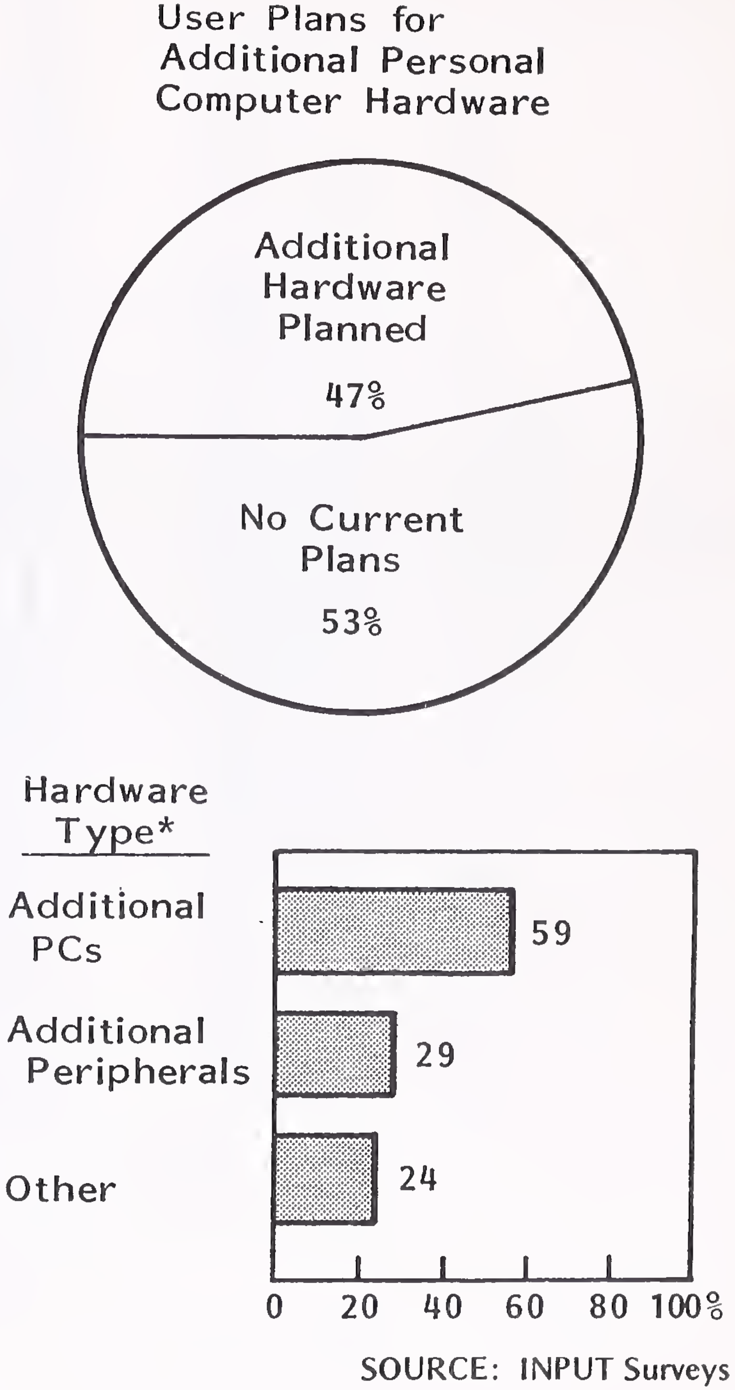
SOURCE: INPUT Surveys

EXHIBIT III-102

PERSONAL COMPUTER ACQUISITION PLANS IN THE BANKING AND FINANCE SECTOR







SOURCE: INPUT Surveys

* Totals more than 100% because of multiple plans

  - Plans for obtaining additional personal computer hardware.

- Expected plans are very close to those of industry in general.

- Exhibit III-103 shows the types of personal computer software packages now used.

  - As might be expected in this sector, the "Calcs" account for most packages used.

- The general categories of applications used are summarized in Exhibit III-104.

  - The general types of applications are similar to those in other sectors.

  - Exhibit III-105 provides examples of actual personal computer applications in use in the banking and finance sector.

- Compared to the average user, personal computer users in this sector are less likely to rely on the IS department for assistance, as shown in Exhibit III-106.

- In this sector 79% of departments using personal computers have had their installation less than a year, as shown in Exhibit III-107, compared to 78% generally.

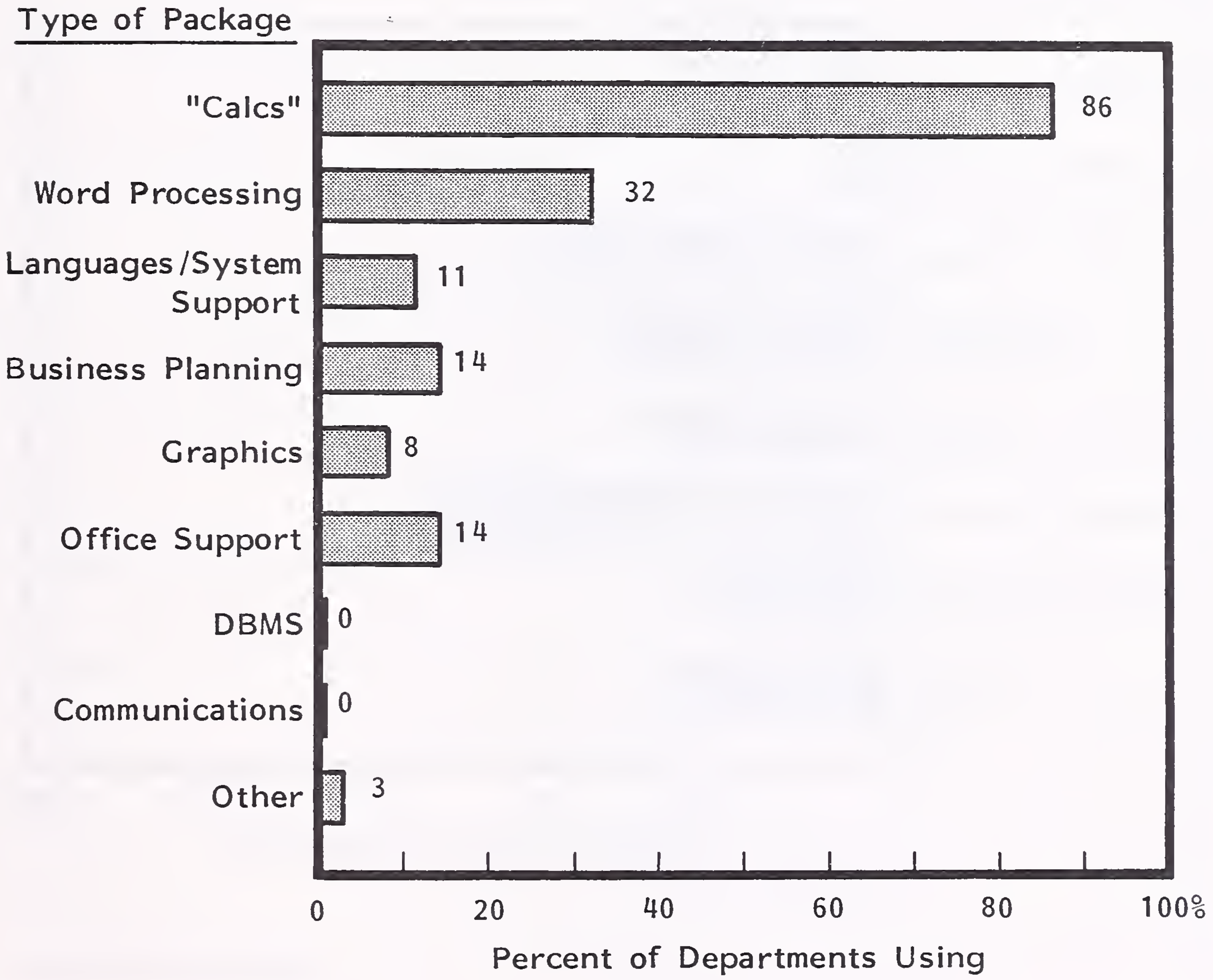
G. INSURANCE SECTOR

1. BUDGETS

- In this sector 91% of the companies expect budget increases in 1983, compared to 61% generally; none expects a decrease compared to 8% generally, as shown in Exhibit III-108.

EXHIBIT III-103

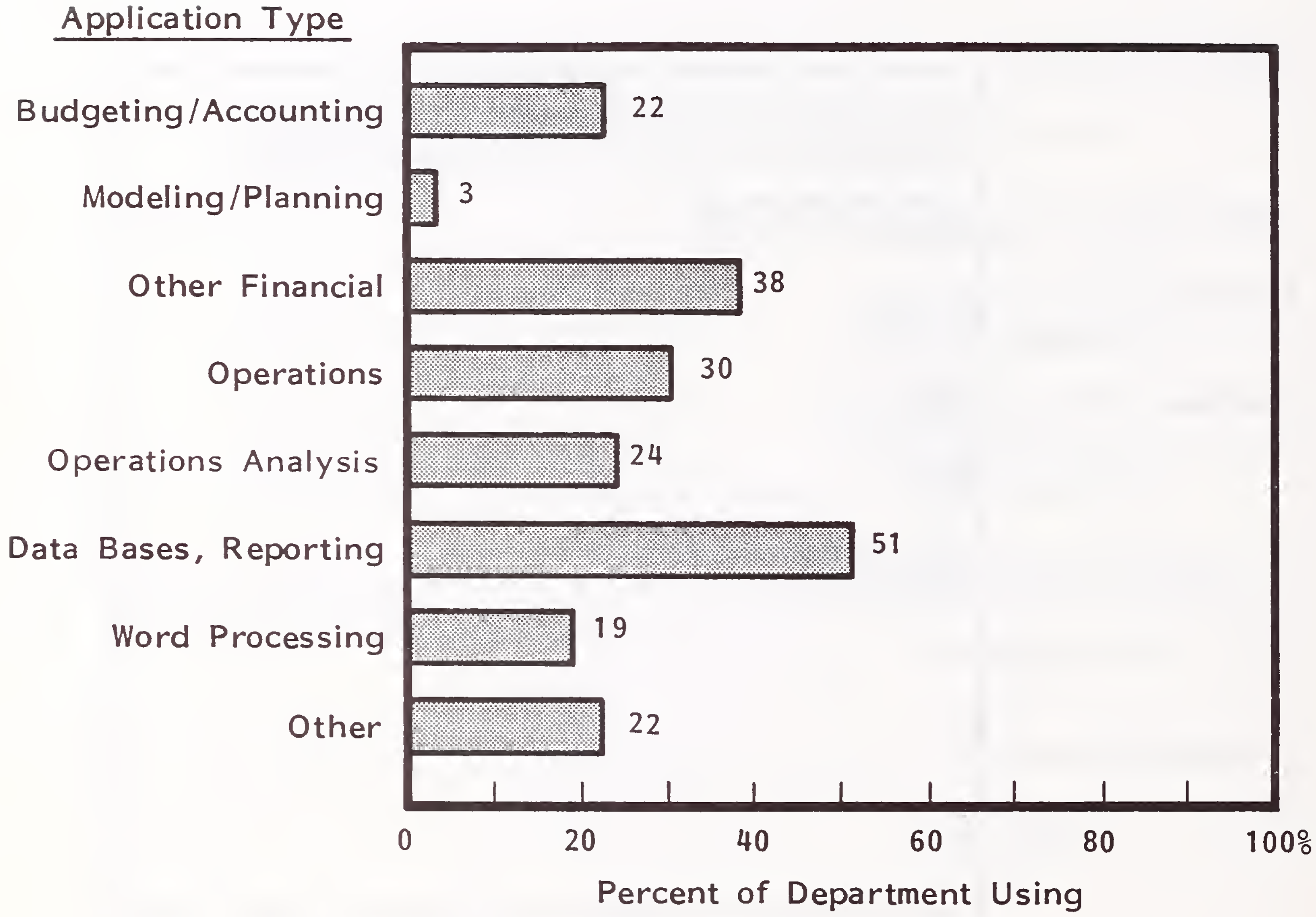
TYPES OF PERSONAL COMPUTER SOFTWARE PACKAGES USED BY THE BANKING AND FINANCE SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-104

PERSONAL COMPUTER APPLICATIONS IN THE BANKING AND FINANCE SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-105

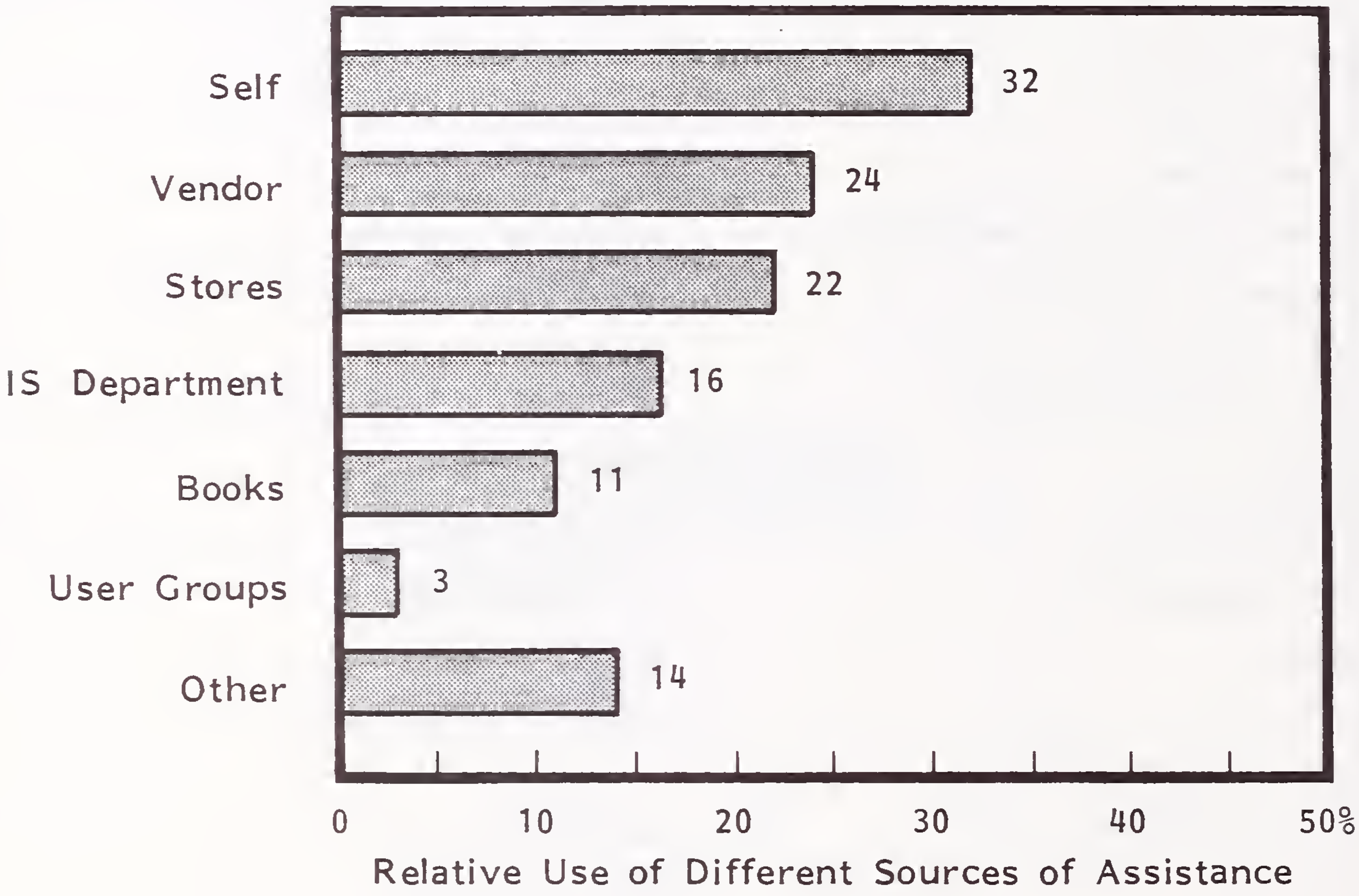
PERSONAL COMPUTER APPLICATIONS IN THE BANKING AND FINANCE SECTOR

Cash Management
Depreciation Analysis
Purchase versus Lease Analysis
Statistical Data
Interest Rates
Spread Sheet
Financial Analysis and Modeling
Management Reports
Profit and Loss
Future Customer Work
Reports
Communications
Bond Management
Records
Payroll
Word Processing
Job Descriptions
DBMS
Amortization
Scheduling
Scoring Test Profiles
Demographic
Market Research
Promotion Letters
Investment Analysis
Fixed Assets
TSO
Business Graphics
Consolidation of Subsidiaries
Cost Flow
Internal Applications
Billing Program
Trend Analysis
Float Report
Bond Issue
Debt Structuring
Records Verification
Mail Lists
Dow Jones Lists
Slide Production
Graphics
Real Estate Tracking

SOURCE: INPUT Surveys

EXHIBIT III-106

SOURCES OF ASSISTANCE FOR PERSONAL COMPUTER USERS IN THE BANKING AND FINANCE SECTOR

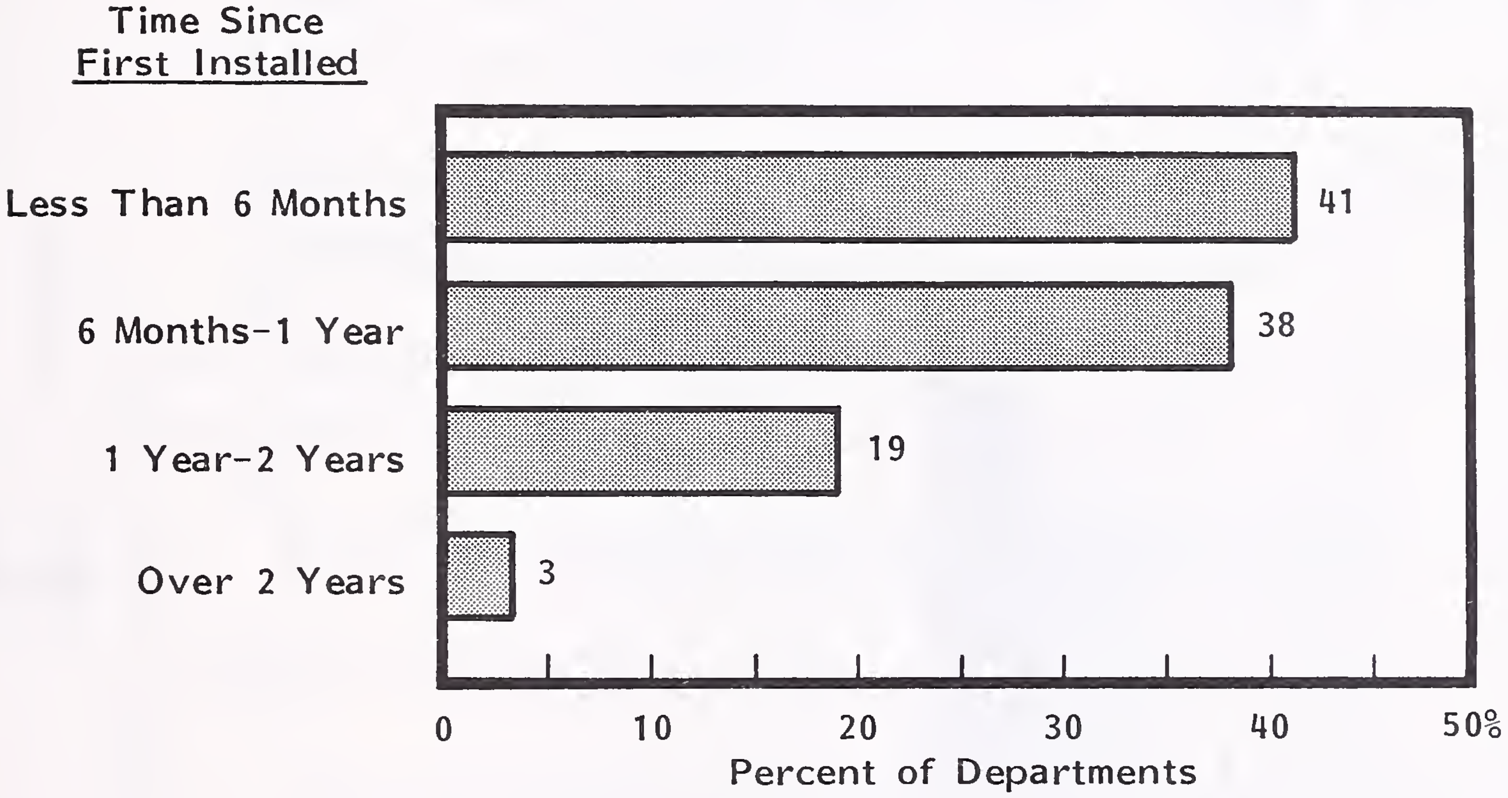


Note: Total Is More Than 100% Because of Multiple Sources.

SOURCE: INPUT Surveys

EXHIBIT III-107

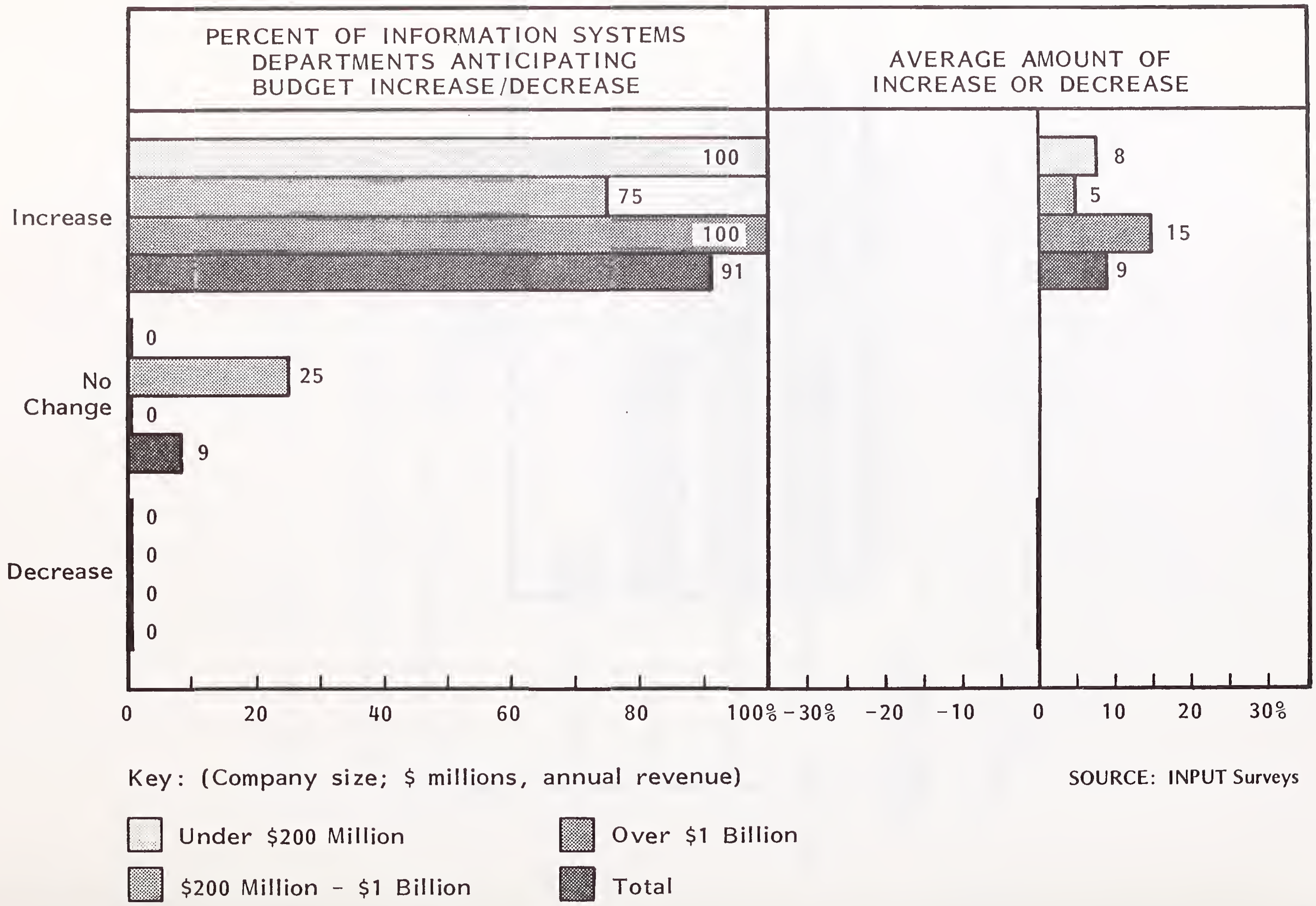
TIME SINCE FIRST PERSONAL COMPUTER INSTALLED IN USER DEPARTMENTS IN THE BANKING AND FINANCE SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-108

ANTICIPATED BUDGET INCREASES FOR 1983 IN THE INSURANCE SECTOR



SOURCE: INPUT Surveys

  - Companies expecting to increase their budgets foresee an average rise of 9%.

- The budget increases expected vary by company size.

  - Large companies: 100% expect increases in the insurance sector, compared to 63% for large companies generally.

  - Medium compnies: 75% expect increases, compared to 63% for medium companies generally.

  - Small companies: 100% expect increases, compared to 57% for small companies generally.

- The average budget growth expected for 1983 in the insurance sector is 8%, compared to 12% in 1982.

  - This represents a decline of 31% in the average rate of growth.

- The 1982 IS budget distribution is shown in Exhibit III-109.

  - Mainframes, terminals, and software are the leading growth areas.

- Exhibit III-110 shows the range of the ratios between the IS budget and the company's total revenues which exist in the insurance sector.

  - The IS percentage of total revenues for the average company (i.e., at the 50th percentile) in each size group was:

    - For large and medium companies: 1.0%, compared to 0.7% for this size company generally.

EXHIBIT III-109

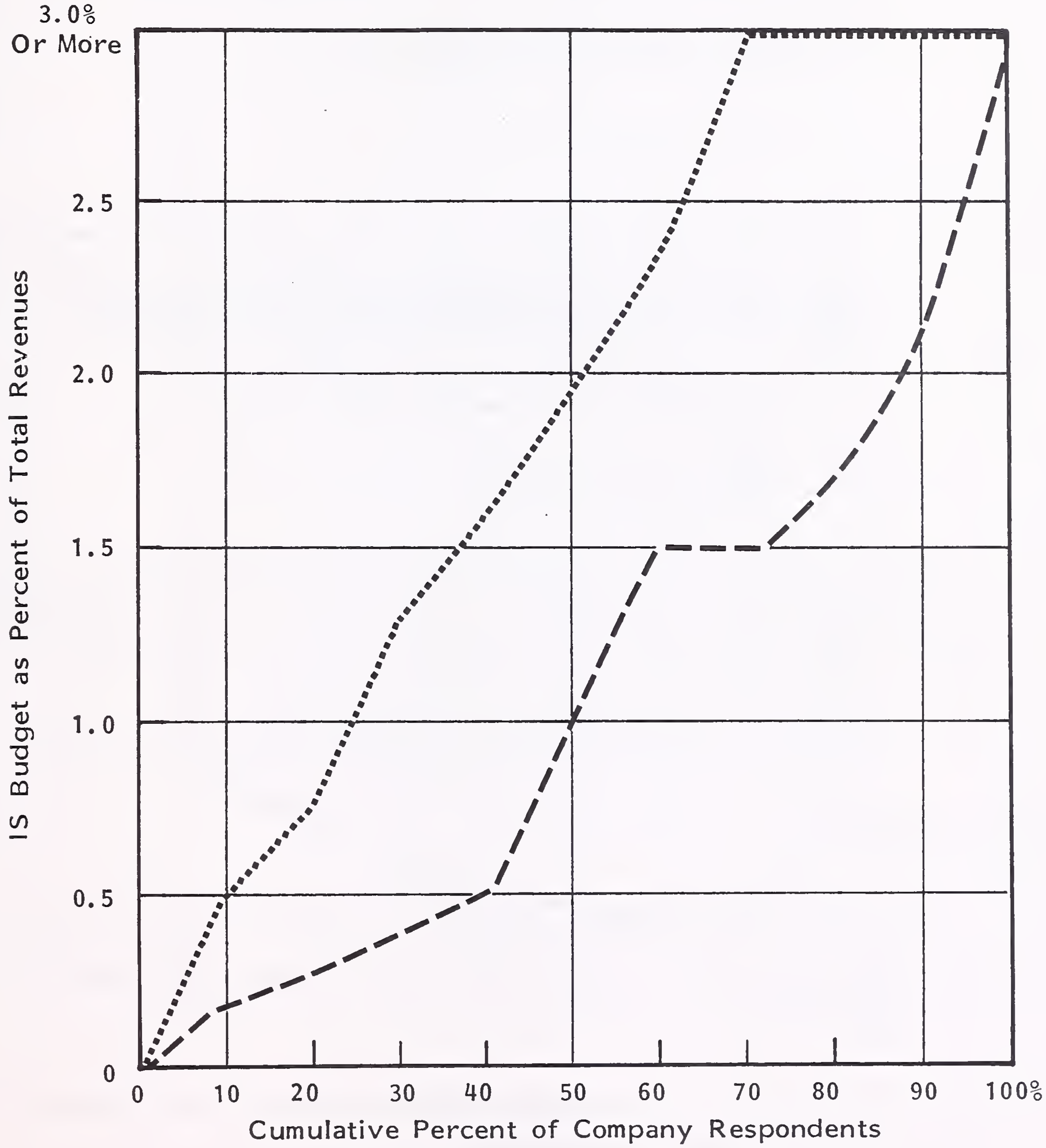
1982 BUDGET DISTRIBUTION AND 1982/1983 CHANGES IN THE INSURANCE SECTOR

BUDGET CATEGORY	PERCENT OF IS BUDGET (1982)	EXPECTED CHANGE 1982 to 1983
Personnel	51%	7%
Hardware		
Mainframe	17	13
Mini/Microcomputer	2	6
Terminals	3	14
Peripherals	2	2
Communications	4	6
Software and Services		
Software	3	14
Processing Services	2	-6
Software Maintenance	1	8
Hardware Maintenance	4	10
Other	11	10
Total	100%	8%

SOURCE: INPUT Surveys

EXHIBIT III-110

INFORMATION SYSTEMS BUDGET AS PERCENT OF TOTAL REVENUES IN THE INSURANCE SECTOR



Key: Company Size = ··········· $0 - $199, — — — $200 and Over

NOTE: Revenues = Premiums (Direct Premiums for P & C)

SOURCE: INPUT Surveys

        - For small companies: 2.0%, compared to 1.2% for this size company generally.

    - The companies that spend least on data processing as a percentage of revenues are those at and below the 20th percentile. Taking the 10th percentile as representative, their IS spending percentages were:

        - Large and medium companies: 0.2%.

        - Small companies: 0.5%.

    - The companies that spend the most on data processing as a percentage of revenues are those at and above the 80th percentile. Taking the 90th percentile as representative, their IS spending percentages were:

        - Large and medium companies: 2.1%.

        - Small companies: 3.0%.

- Median spending on IS per corporate employee was $2,840. However, there was a broad range of spending ratios, as shown in the diagram in Exhibit III-111.

    - The reasons for this variation were discussed in Chapter II, Section B.

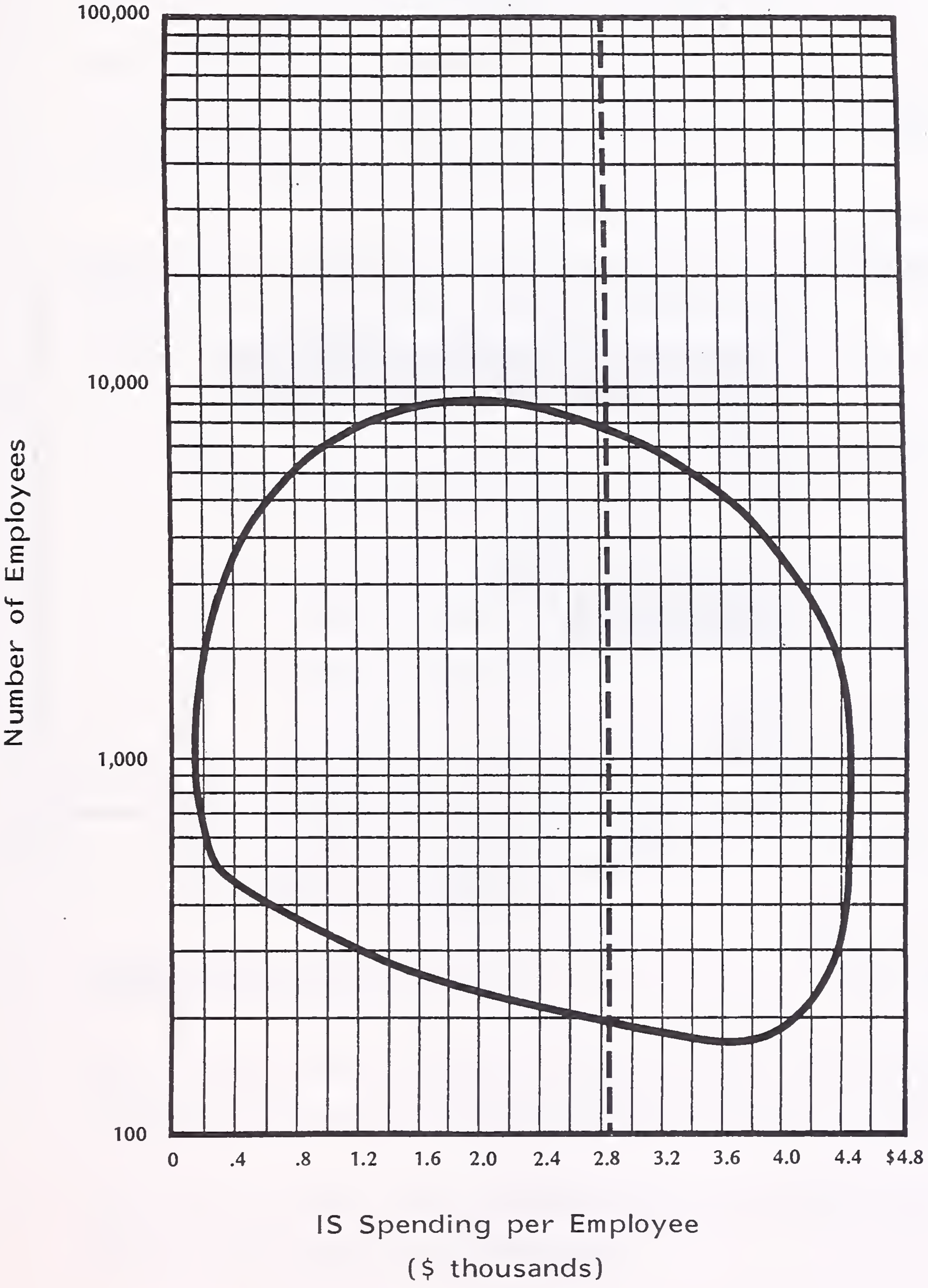
2. STAFFING

- In the insurance sector 73% of companies expect their IS staffs to increase in the next 12 months, compared to the industry average of 58%, as shown in Exhibit III-112.

    - The net increase in number of staff is expected to be 6%, compared to the all-industry average of 4%.

EXHIBIT III-111

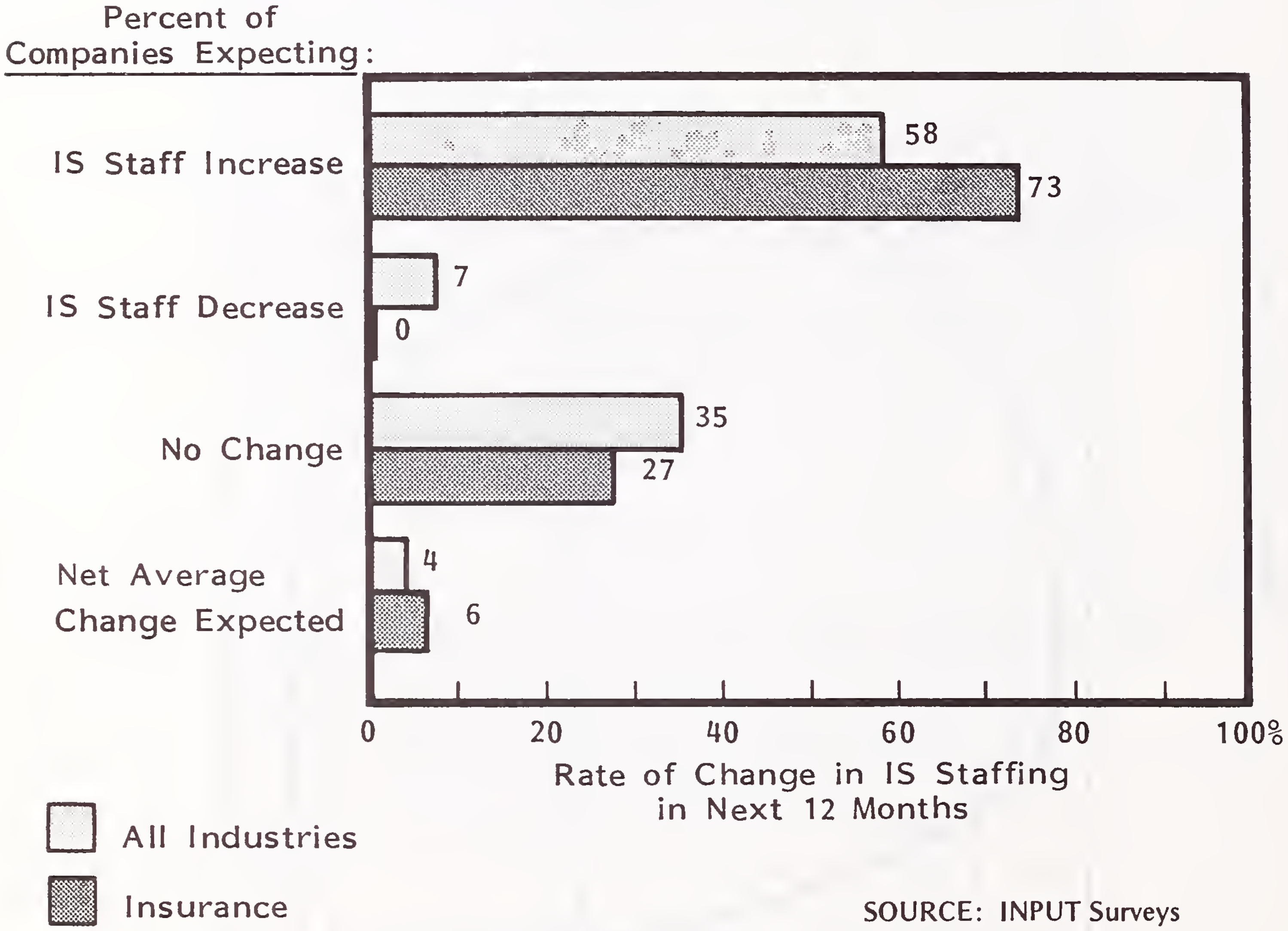
INFORMATION SYSTEMS SPENDING PER EMPLOYEE BY COMPANY SIZE IN THE INSURANCE SECTOR



▬ ▬ ▬ ▬ = Median

SOURCE: INPUT Surveys

INFORMATION SYSTEMS STAFFING CHANGES EXPECTED IN THE NEXT TWELVE MONTHS IN THE INSURANCE SECTOR



SOURCE: INPUT Surveys

- Turnover in this sector is expected to be about 60% of the all-industry average in 1983, as shown in Exhibit II-9.

  - Current turnover rates for individual positions are shown in Exhibit III-113. For technical positions the turnover rate is close to the all-industry average.

- Difficulty in recruiting staff in this sector is generally the same as for other sectors, as shown in Exhibit III-114.

- The number of programs to be maintained averages 1,000 in this sector, although the range, both in absolute numbers and based on company size, is quite broad, as shown in Exhibit III-115.

  - Maintenance, as a proportion of total workload, is very close to the all-industry average, as shown in Exhibit III-116.

  - Company size does have an appreciable effect on maintenance loads, with the larger companies reporting considerably higher maintenance loads, as shown in Exhibit III-117.

    - However, the large company maintenance load is supposed to drop by almost 20 percentage points over a two-year period. Many new application packages are expected to be installed during this period.

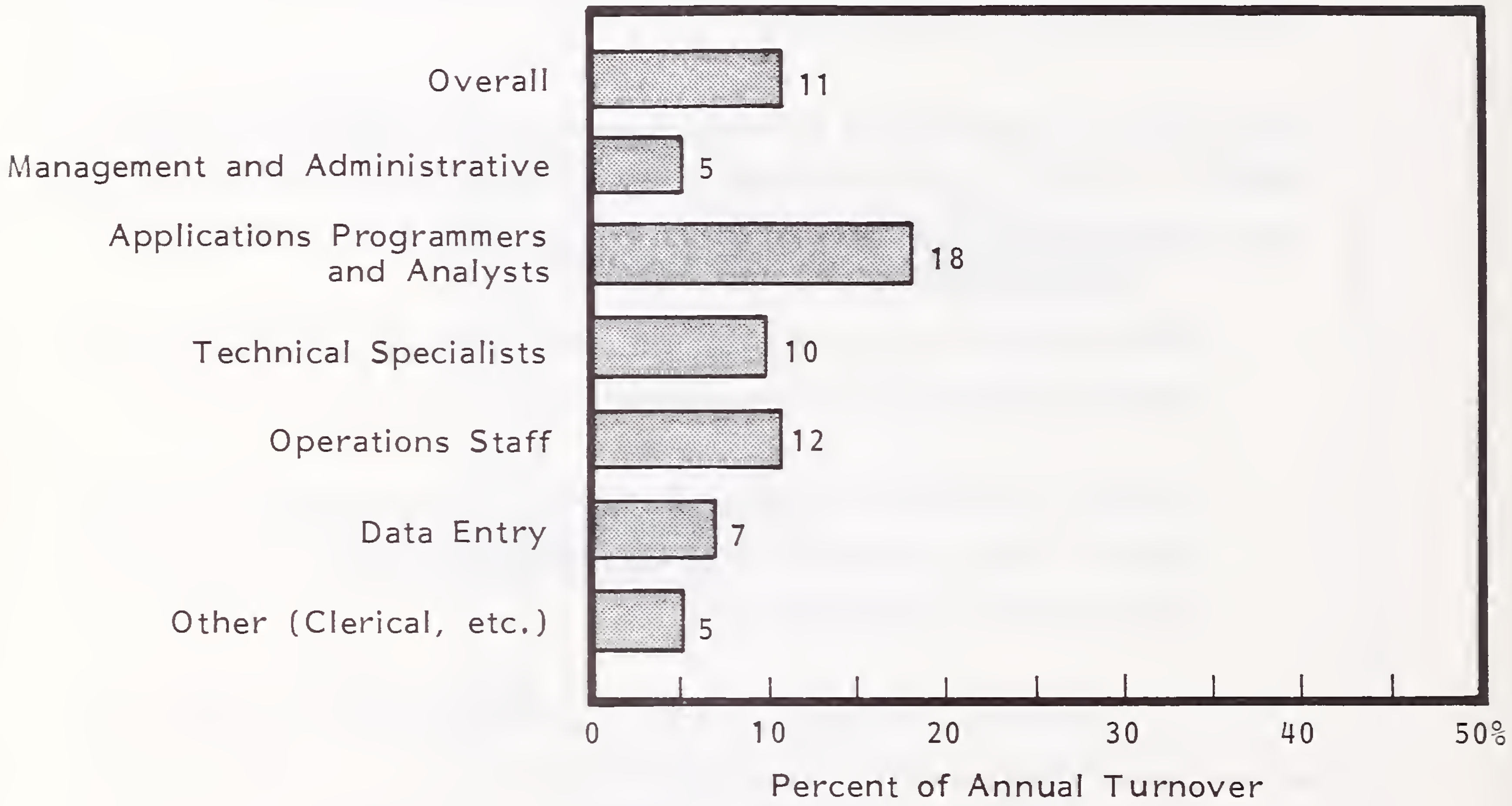
3. INFORMATION SYSTEMS ISSUES

- Note: please refer to Chapter II, Section D for a general discussion of IS problems, objectives, and initiatives and their interrelationships.

- The insurance industry sees its major problems as hardware, and planning and control issues, as shown in Exhibit III-118.

EXHIBIT III-113

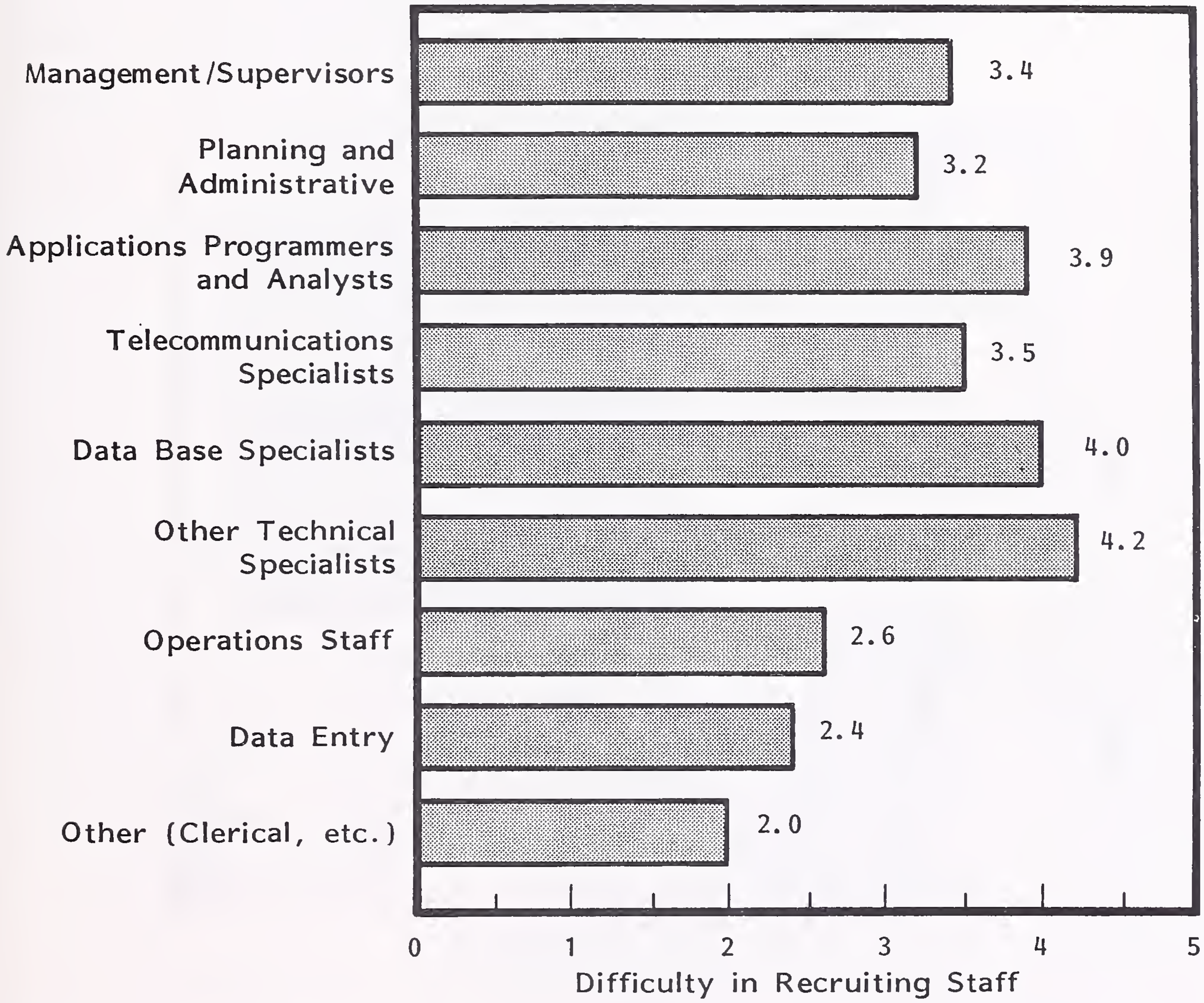
INFORMATION SYSTEMS STAFFING CURRENT ANNUAL TURNOVER IN THE INSURANCE SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-114

INFORMATION SYSTEMS DIFFICULTY IN RECRUITING STAFF IN THE INSURANCE SECTOR

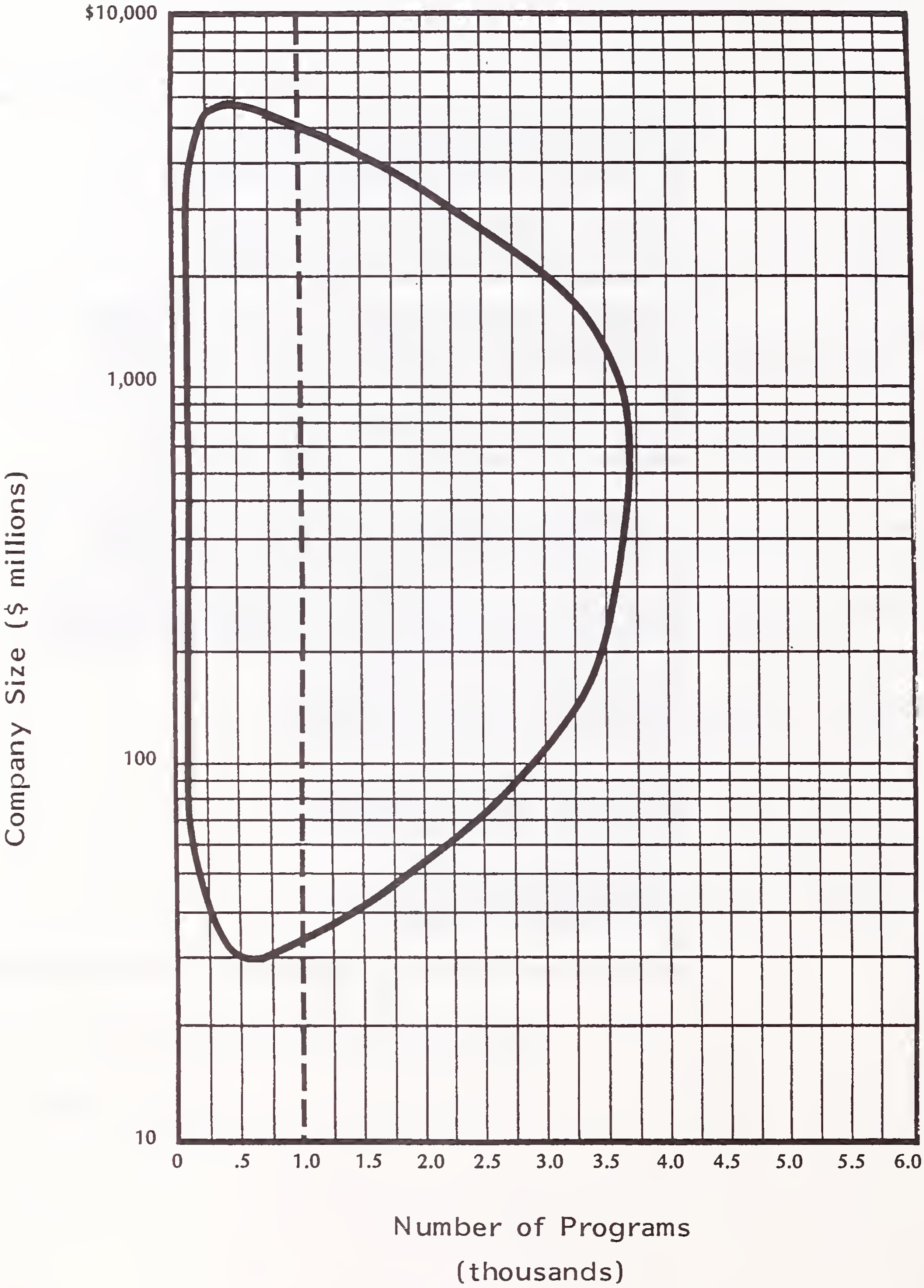


Scale: 1 = Low, 5 = High

SOURCE: INPUT Surveys

EXHIBIT III-115

NUMBER OF PROGRAMS BY COMPANY SIZE IN THE INSURANCE SECTOR

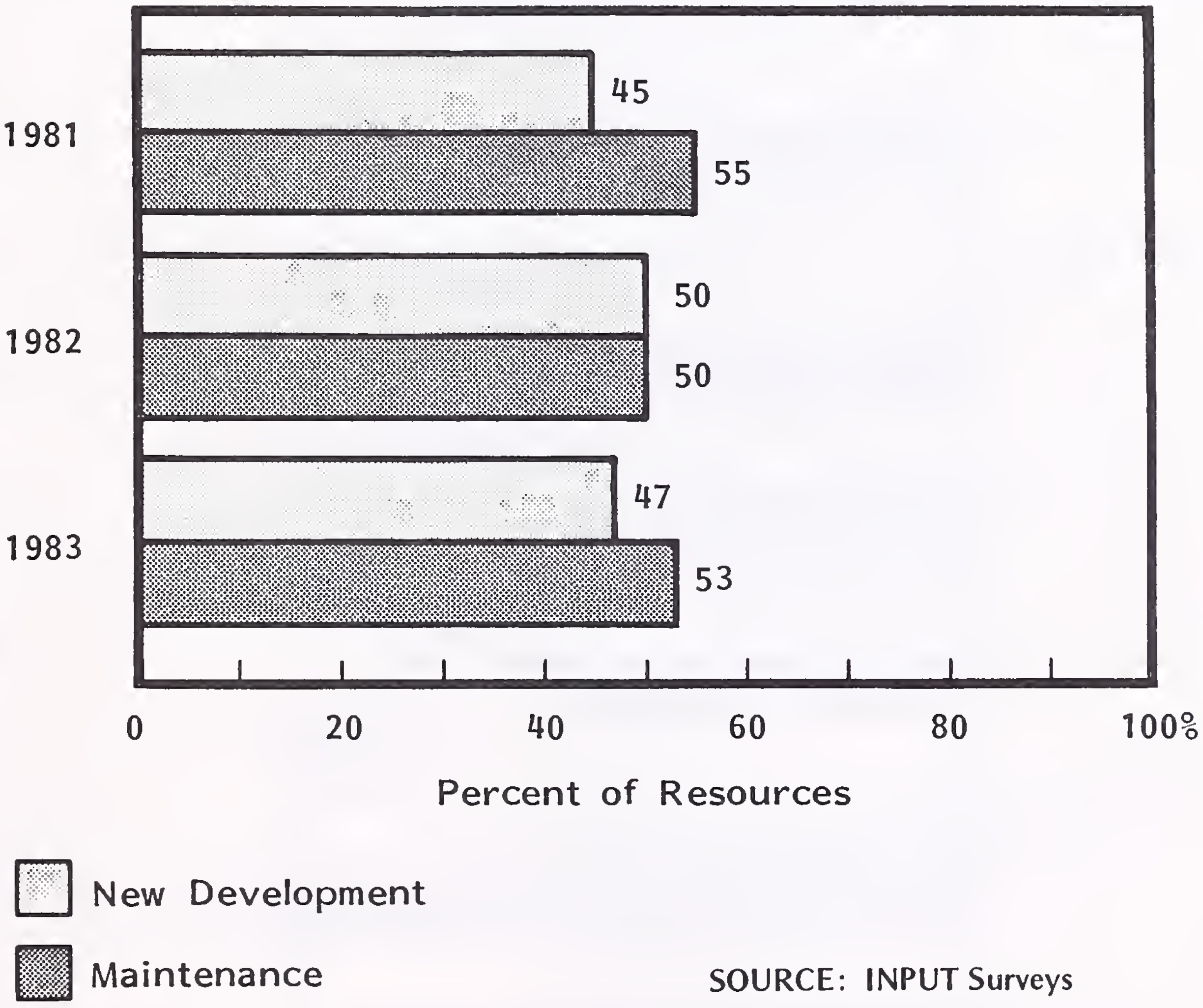


— — — — = Median

SOURCE: INPUT Surveys

EXHIBIT III-116

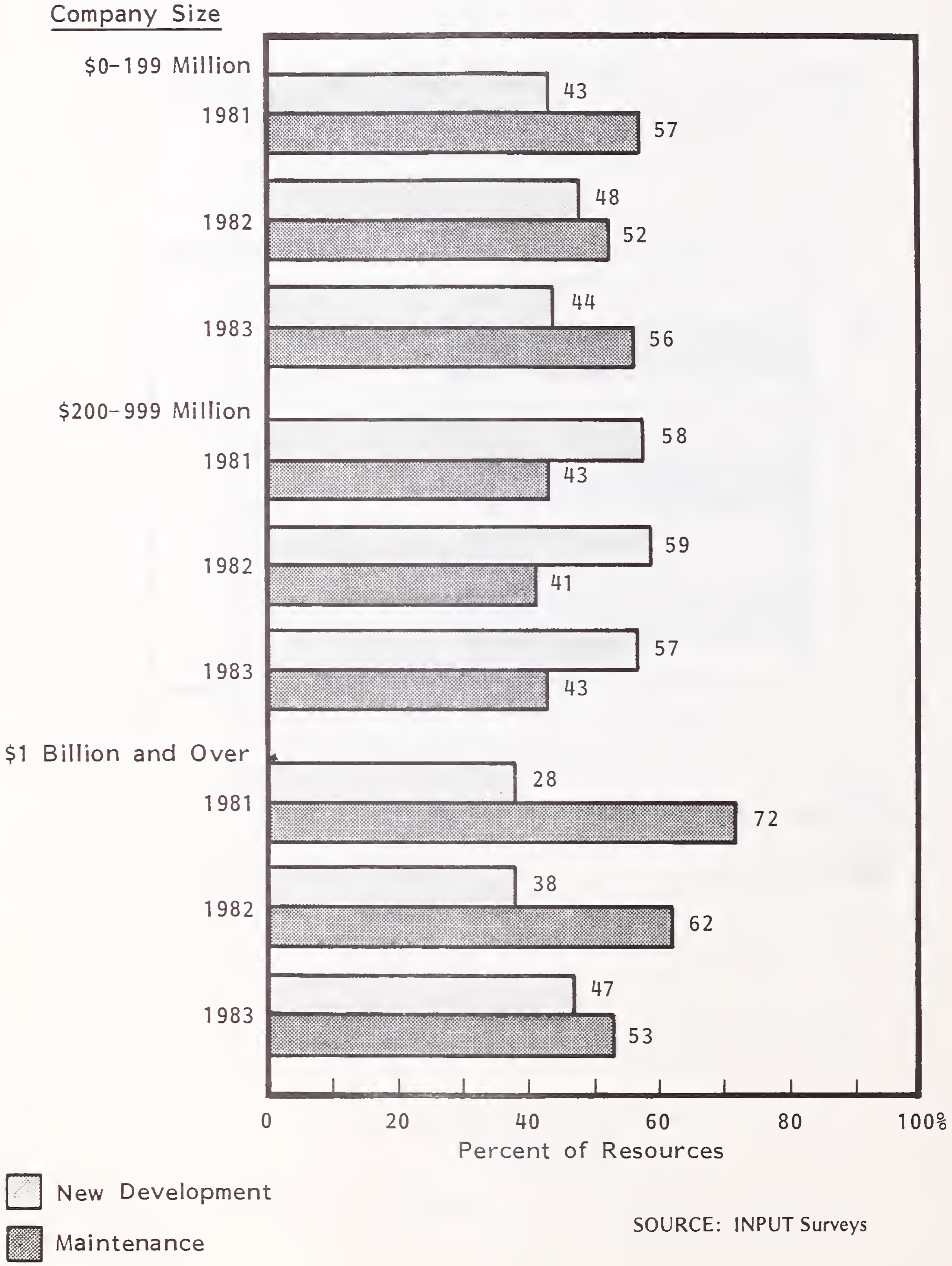
NEW PROGRAM DEVELOPMENT VERSUS MAINTENANCE IN THE INSURANCE SECTOR, 1981-1983



SOURCE: INPUT Surveys

EXHIBIT III-117

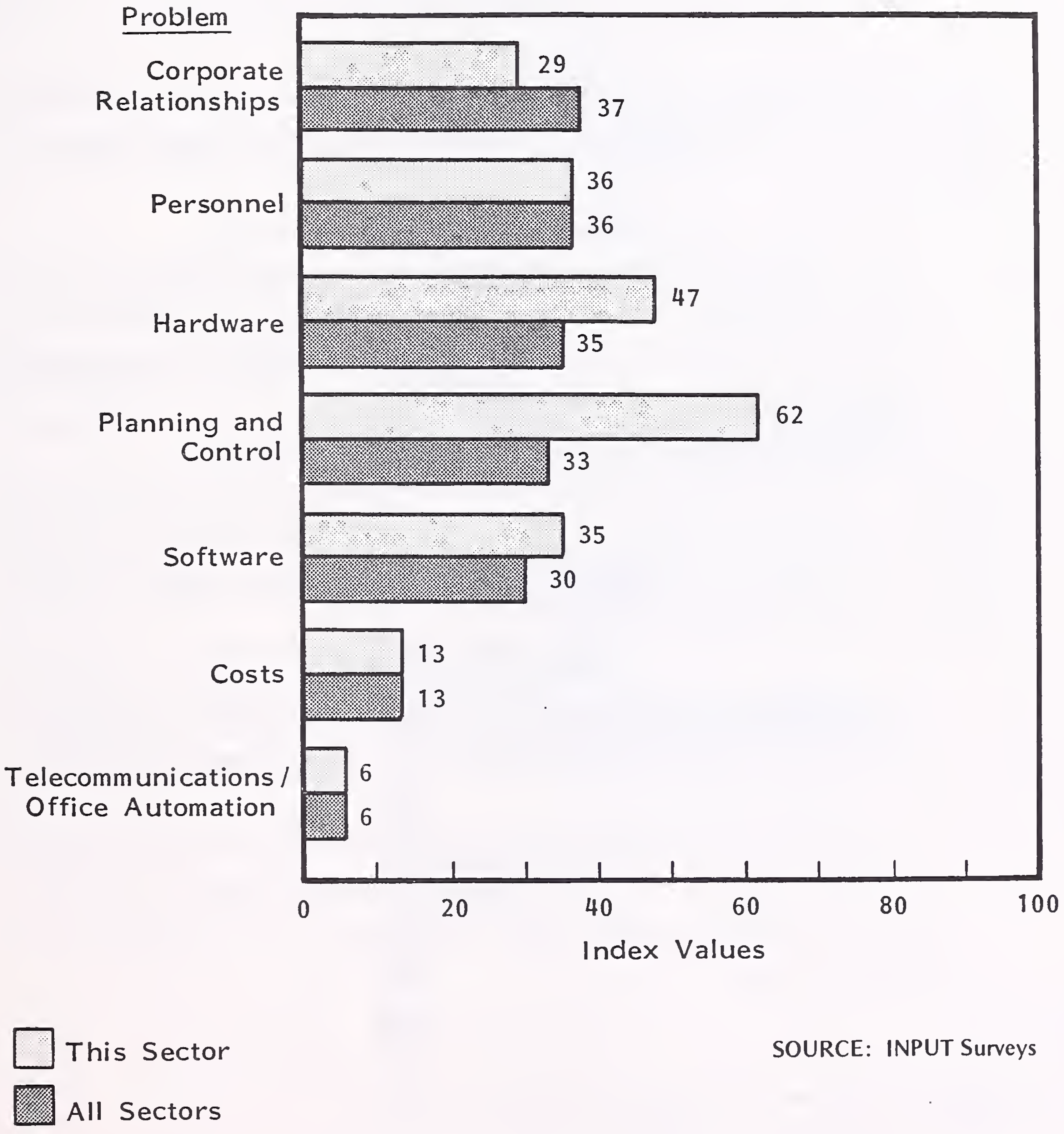
NEW PROGRAM DEVELOPMENT VERSUS MAINTENANCE IN THE INSURANCE SECTOR, 1981-1983



SOURCE: INPUT Surveys

EXHIBIT III-118

INFORMATION SYSTEMS PROBLEMS IN THE INSURANCE SECTOR



SOURCE: INPUT Surveys

  - These are both part of the major decisions that many companies now face in linking together their distribution networks, as shown in Chapter I, Section D.

  - More detailed information about specific problem areas is contained in Exhibit III-119. This exhibit shows the percentage of companies in this sector which regard an issue as a major problem.

- The high importance of telecommunications and office automation as a planning objective is directly linked to this distribution planning issue, as shown in Exhibit III-120.

  - More detailed information about specific planning objectives is contained in Exhibit III-121. This exhibit shows the percentage of companies in this sector which have identified particular planning objectives as being of major importance to them.

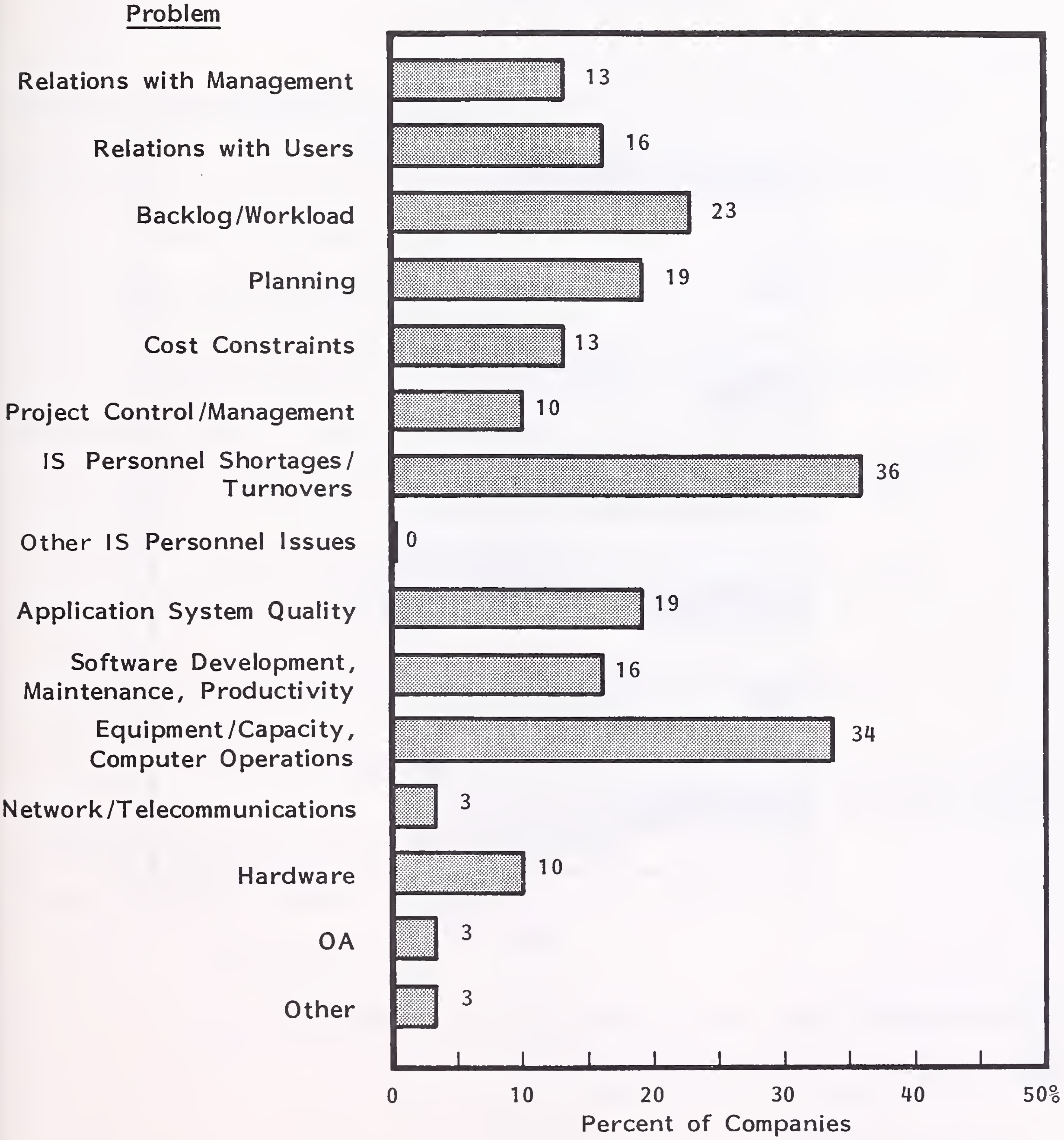
- However, telecommunications and office automation are still strictly planning issues in virtually all companies. The major initiatives are in the software area; the insurance sector places more emphasis on software than any other sector, as shown in Exhibit III-122.

  - Even companies reasonably satisfied with current software are planning replacements for greater efficiency and to meet competitive offerings.

  - More detailed information about specific areas where an initiative is planned is contained in Exhibit III-123. This exhibit shows the percentage of companies in this sector which plan a major initiative in a particular area.

EXHIBIT III-119

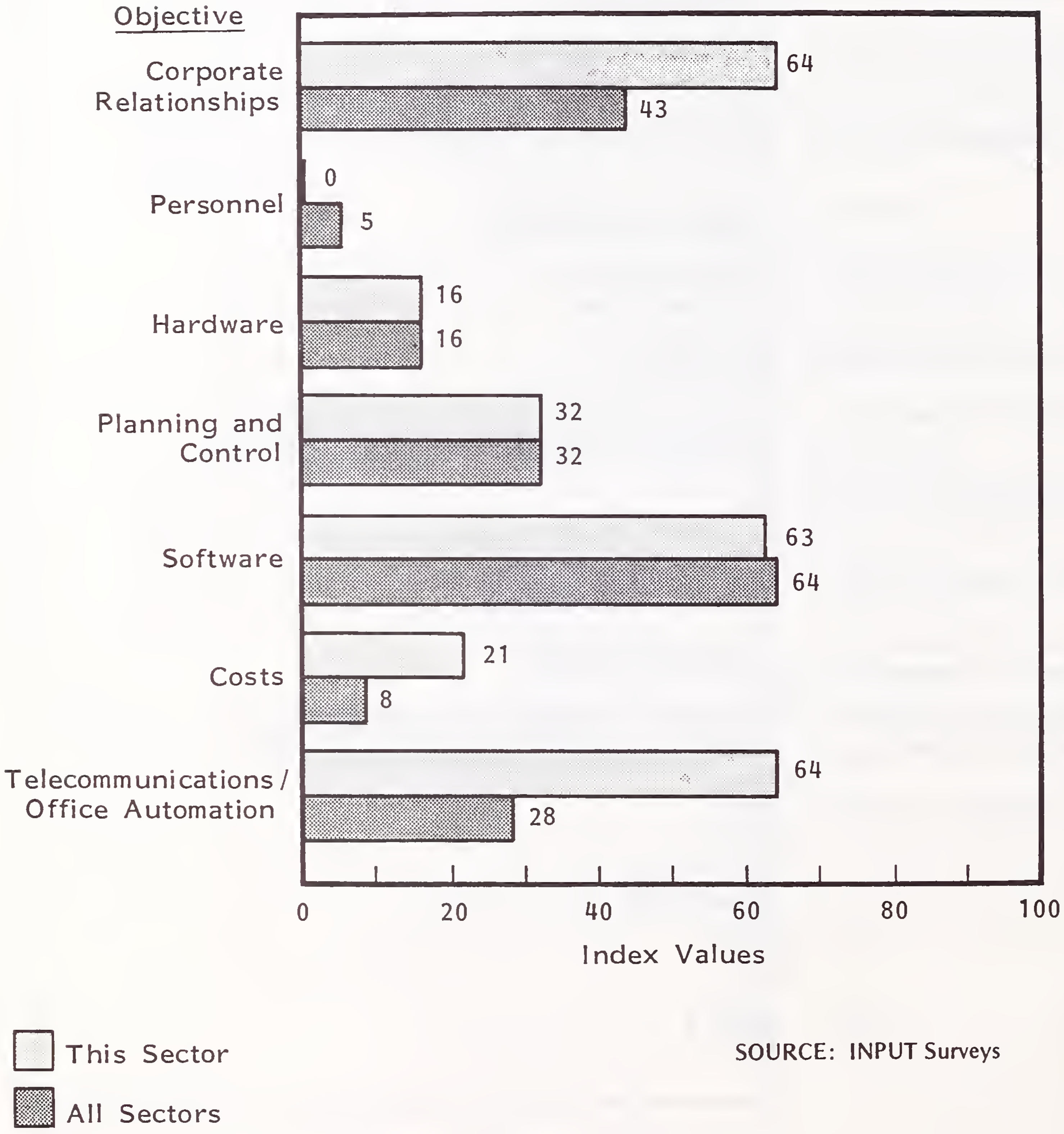
INFORMATION SYSTEMS PROBLEMS IN THE INSURANCE SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-120

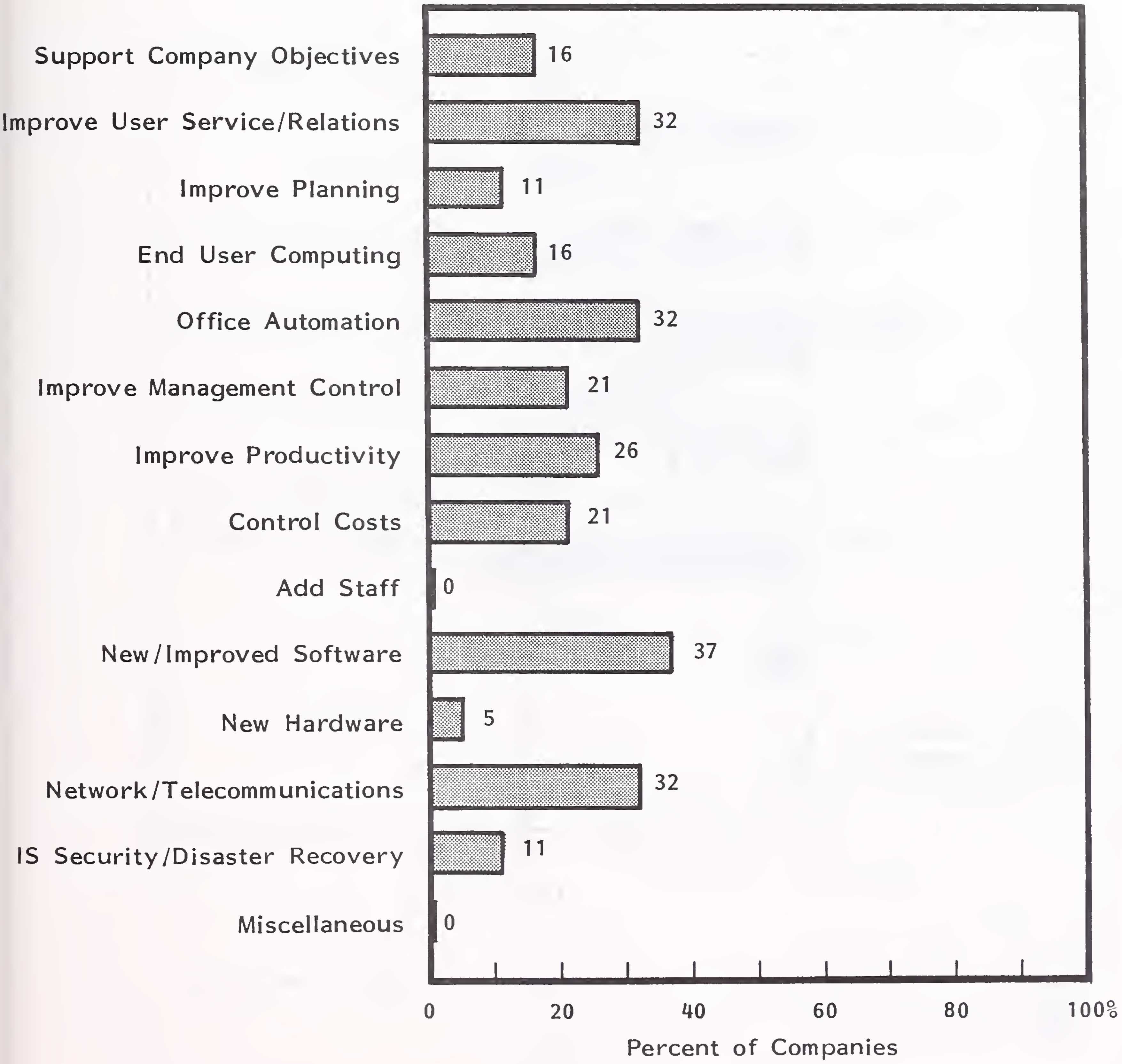
INFORMATION SYSTEMS OBJECTIVES IN THE INSURANCE SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-121

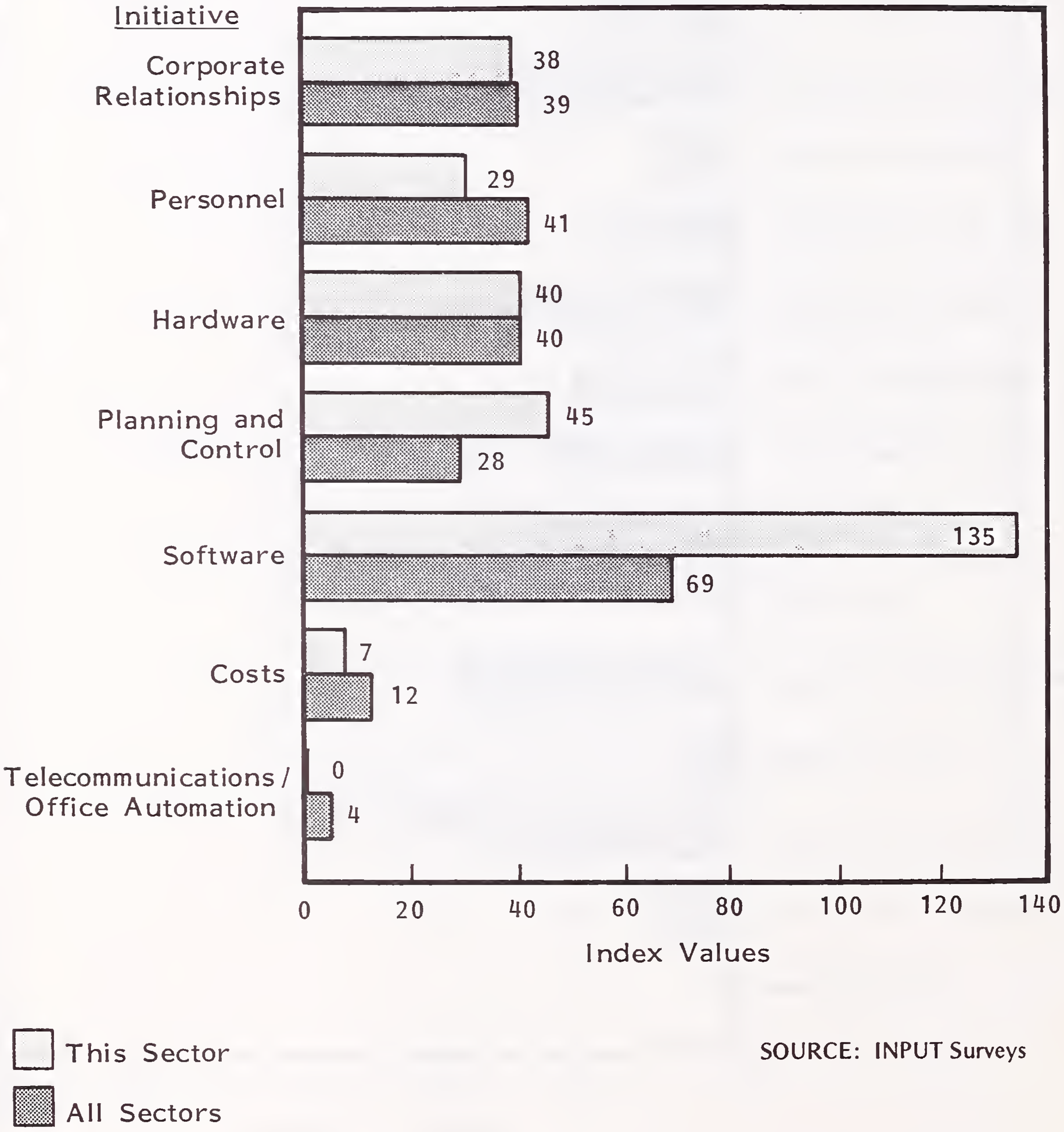
INFORMATION SYSTEMS OBJECTIVES IN THE INSURANCE SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-122

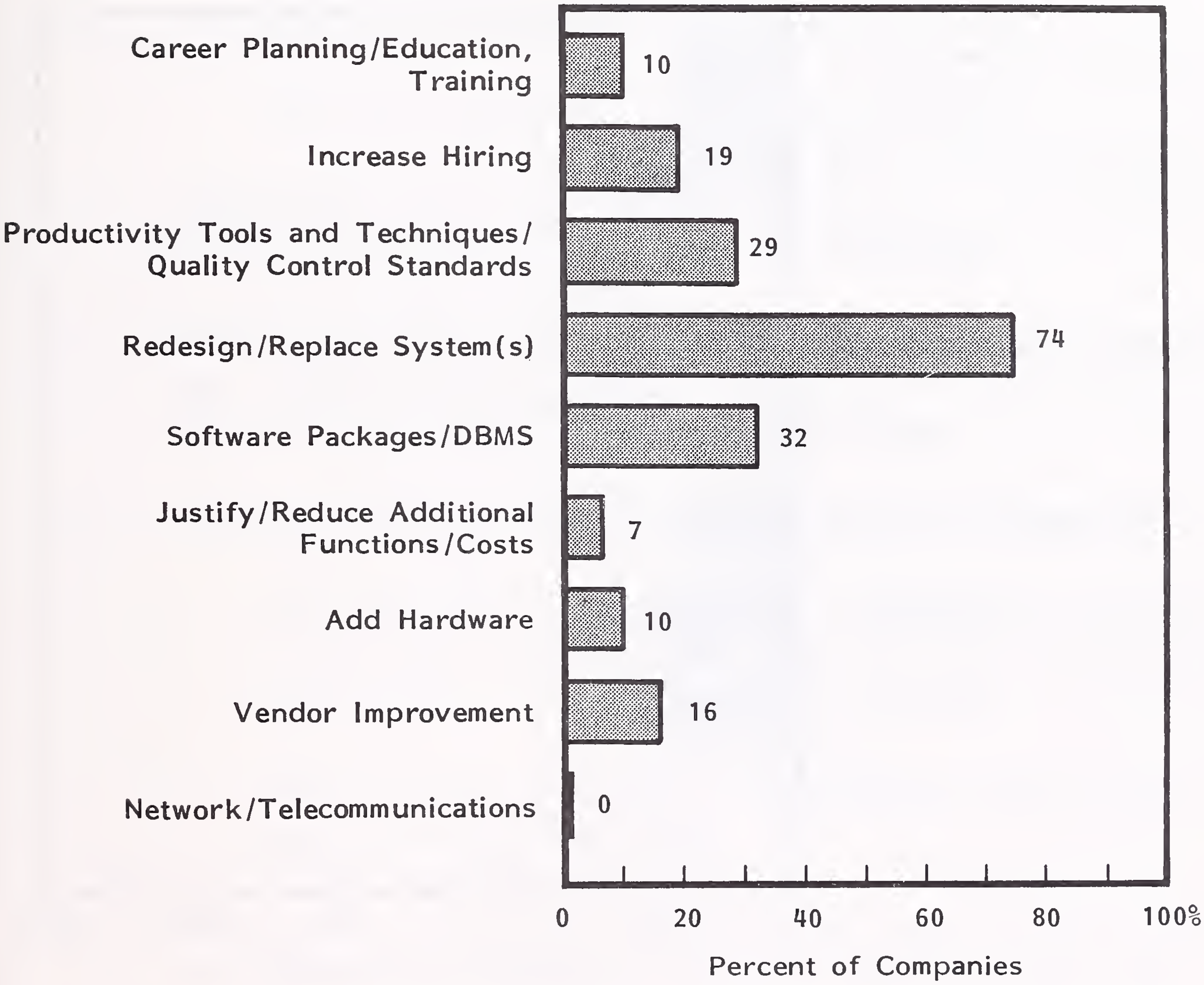
INFORMATION SYSTEMS INITIATIVES IN THE INSURANCE SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-123

INFORMATION SYSTEMS INITIATIVES PLANNED IN THE INSURANCE SECTOR

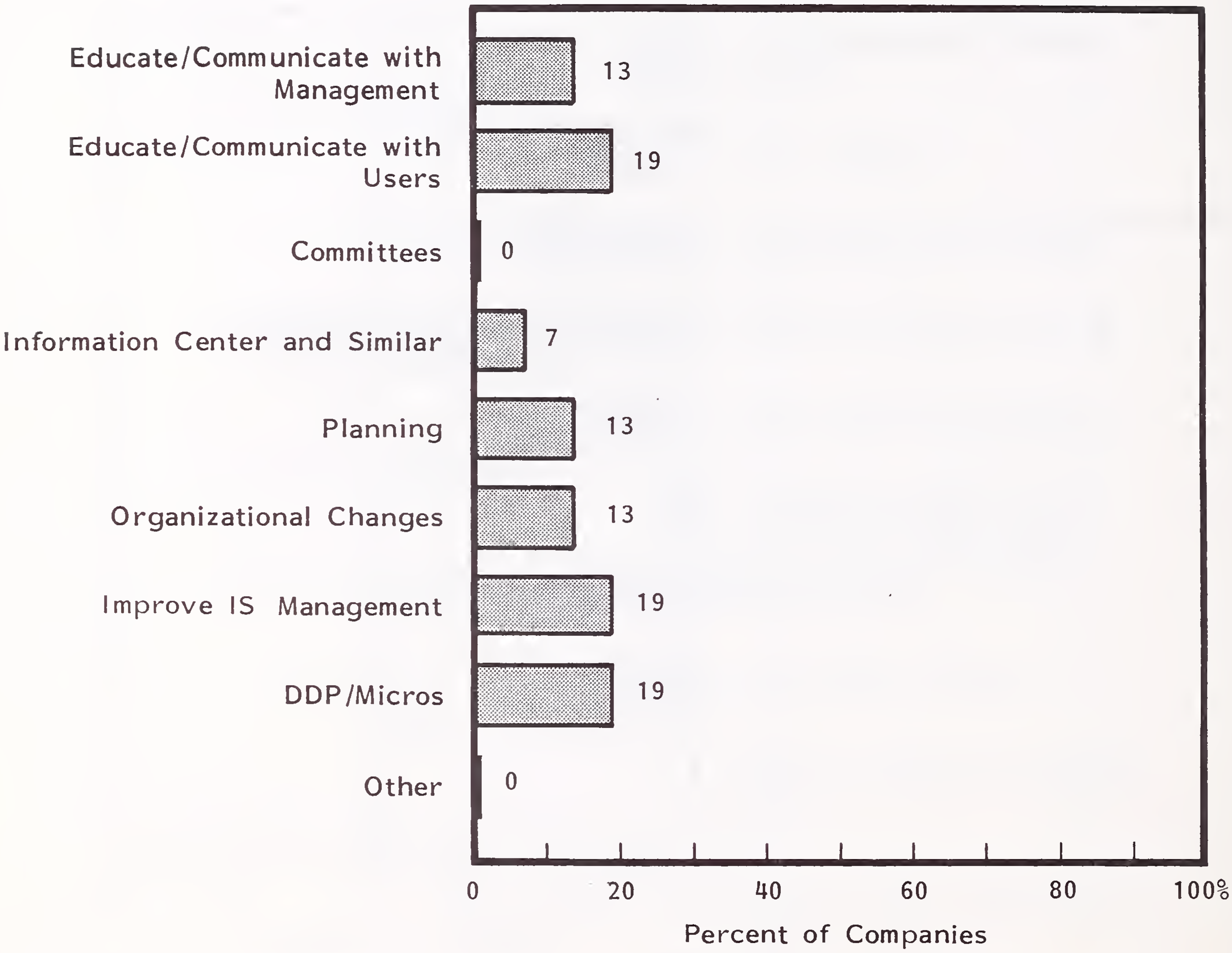


Continued

SOURCE: INPUT Surveys

EXHIBIT III-123 (Cont.)

INFORMATION SYSTEMS INITIATIVES PLANNED IN THE INSURANCE SECTOR



SOURCE: INPUT Surveys

4. PERSONAL COMPUTERS

- Plans for the use of personal computers in this sector are shown in Exhibit III-124 and include:
  - The overall level of use in five years.
  - Plans for obtaining additional personal computer software.
  - Plans for obtaining additional personal computer hardware.

- The insurance sector's plans are similar to those in other industries except that much greater reliance on packaged software is anticipated.

- Exhibit III-125 shows the types of personal computer software packages now used. The "Calc" packages are used by every department interviewed; communications software is used somewhat more than average.

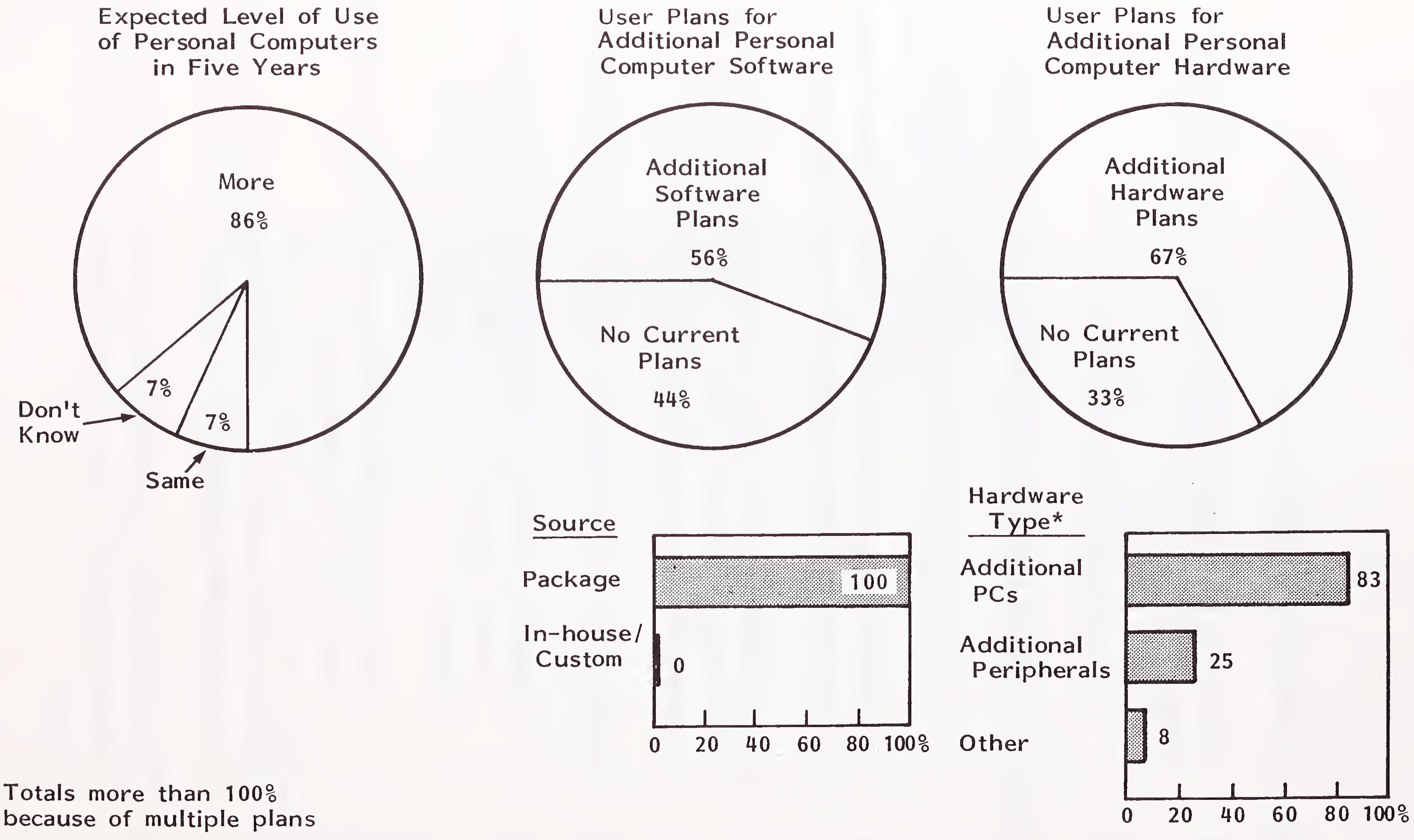
- The general categories of applications used are summarized in Exhibit III-126.
  - Specialized financial applications (e.g., actuarial) are the most common. Data base use is much less common than in most other sectors.
  - Exhibit III-127 provides examples of actual personal computer applications in use in the insurance sector.

- Compared to the average user, personal computer users in this sector are likely to rely on the IS department for assistance, as shown in Exhibit III-128.

- In this sector 84% of departments using personal computers have had their installation less than a year, as shown in Exhibit III-129, compared to 78% generally.

EXHIBIT III-124

PERSONAL COMPUTER ACQUISITION PLANS IN THE INSURANCE SECTOR

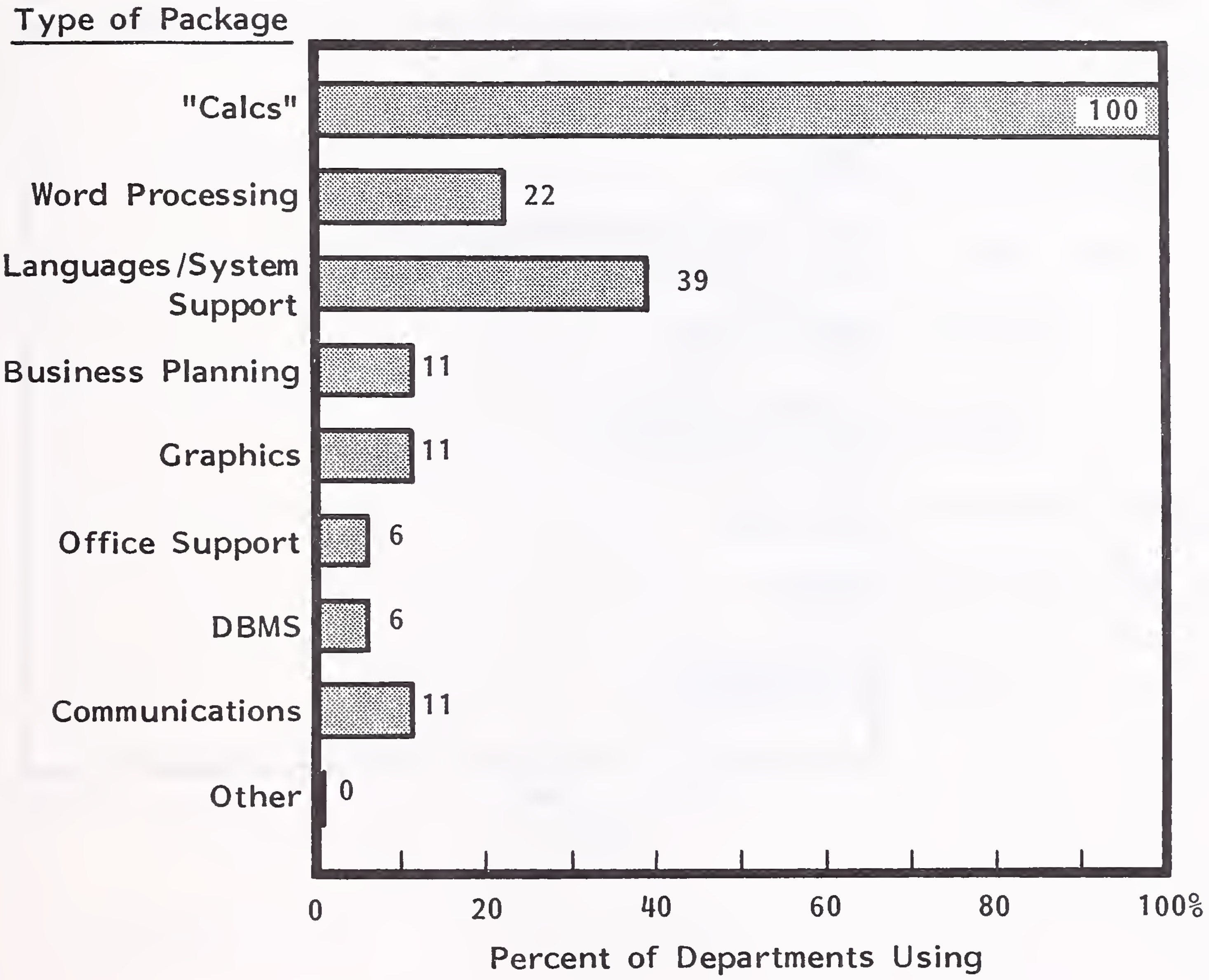


* Totals more than 100% because of multiple plans

SOURCE: INPUT Surveys

EXHIBIT III-125

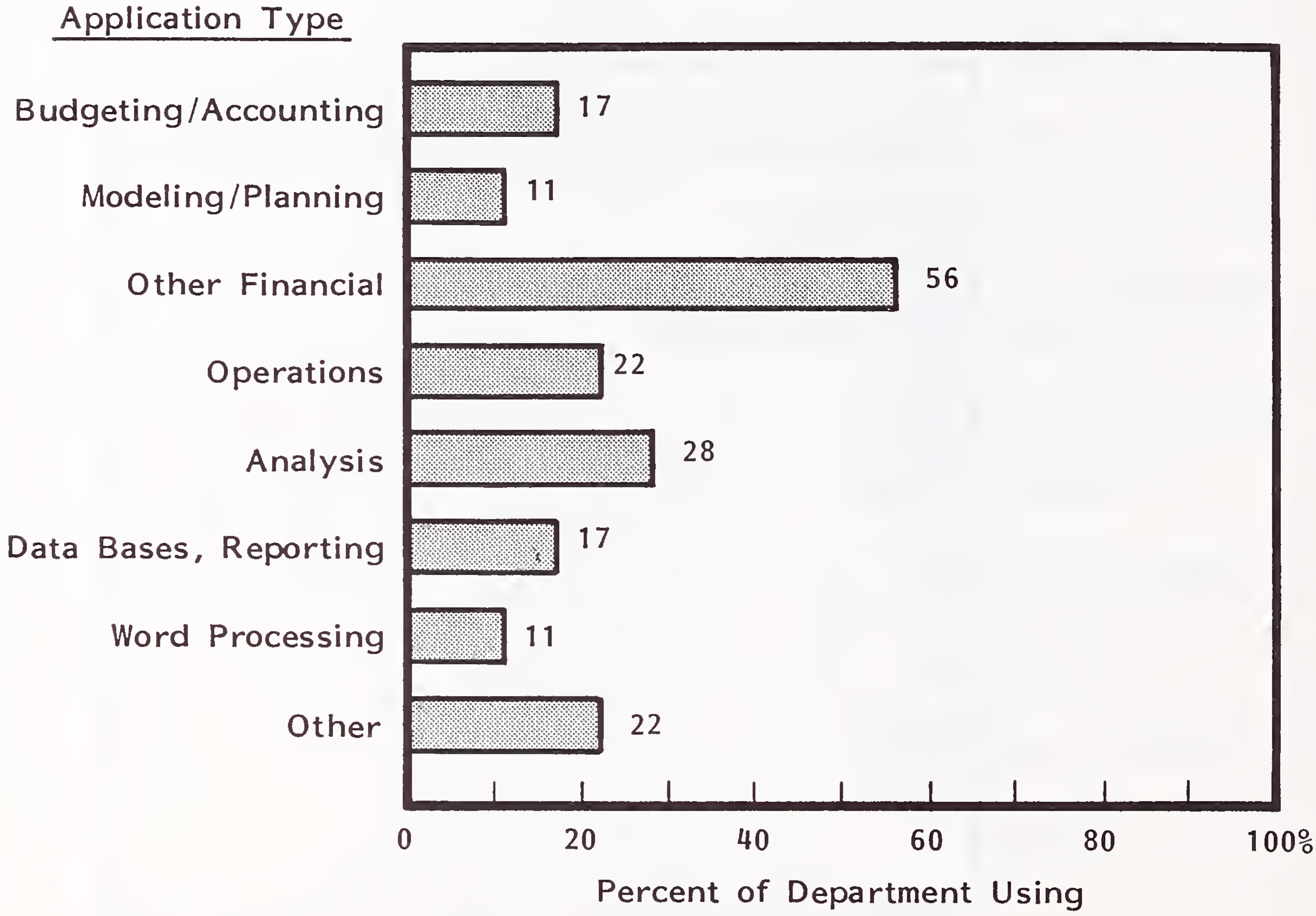
TYPES OF PERSONAL COMPUTER SOFTWARE PACKAGES USED BY THE INSURANCE SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-126

PERSONAL COMPUTER APPLICATIONS IN THE INSURANCE SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-127

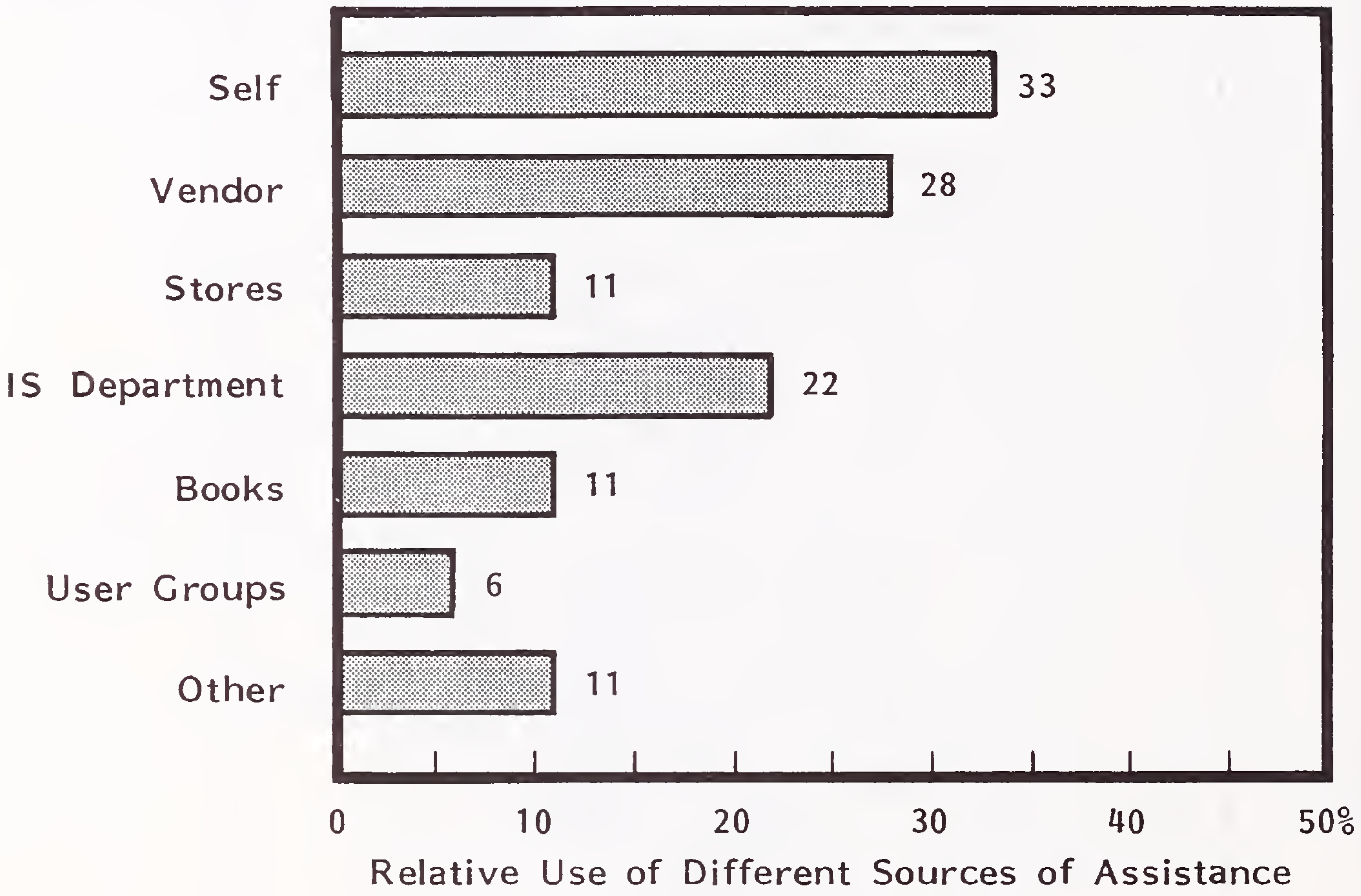
PERSONAL COMPUTER APPLICATIONS IN THE INSURANCE SECTOR

Subledger
Yield Projections
Investment Analysis
Financial Modeling and Analysis
Real Estate
Purchasing
Letters
Spread Sheet
Time Management
Word Processing
Tax Calculations
IS Auditing
Financial Statements
Actuarial Analysis
Statistical Analysis
Cash Flow Projections
Performance Statements
Portfolio
Budgeting
Real Estate Analysis
Graphics Presentations
Engineering
Energy Reports

SOURCE: INPUT Surveys

EXHIBIT III-128

SOURCES OF ASSISTANCE FOR PERSONAL COMPUTER USERS IN THE INSURANCE SECTOR

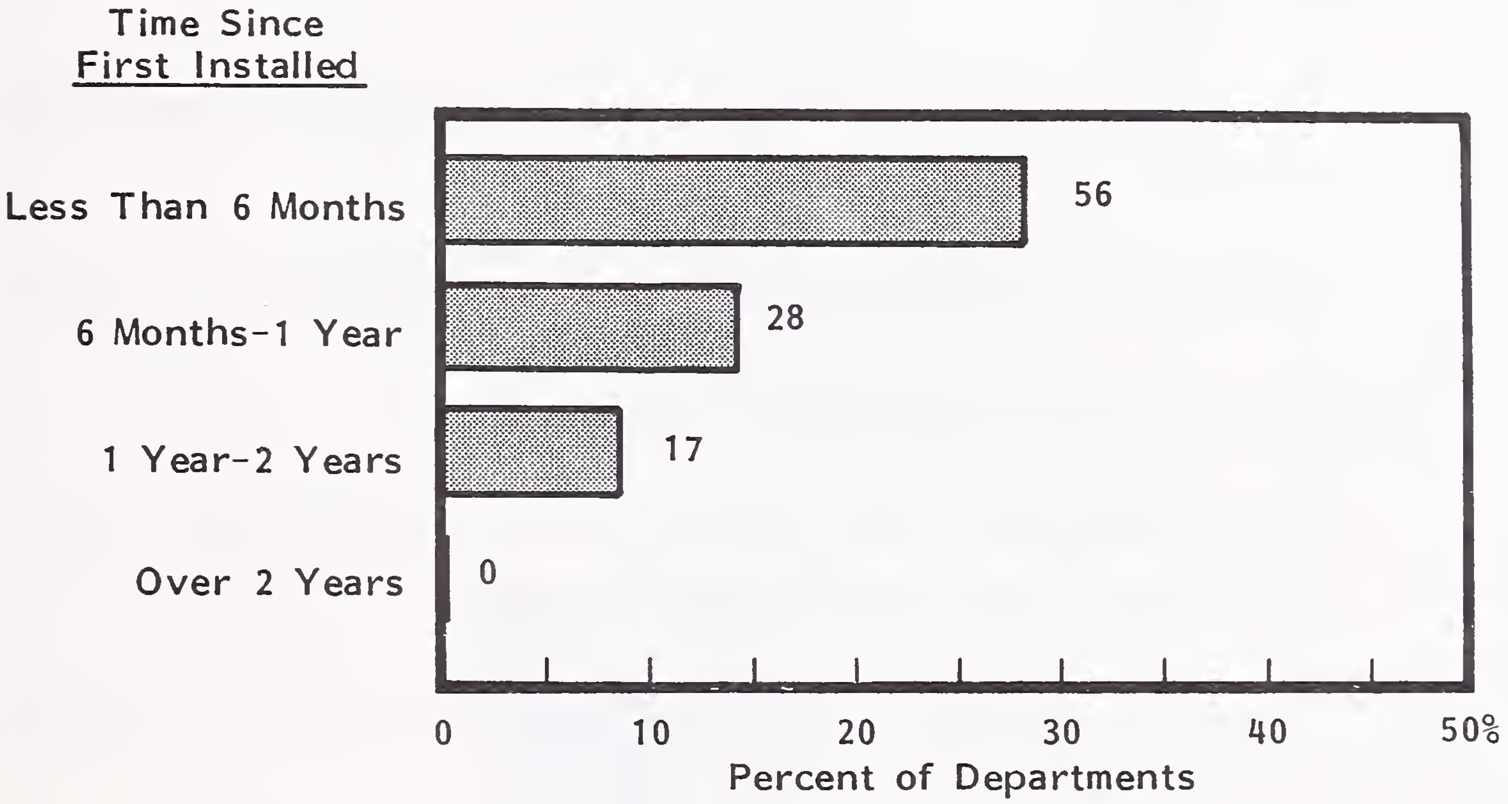


Note: Total Is More Than 100% Because of Multiple Sources.

SOURCE: INPUT Surveys

EXHIBIT III-129

TIME SINCE FIRST PERSONAL COMPUTER INSTALLED IN USER DEPARTMENTS IN THE INSURANCE SECTOR



SOURCE: INPUT Surveys

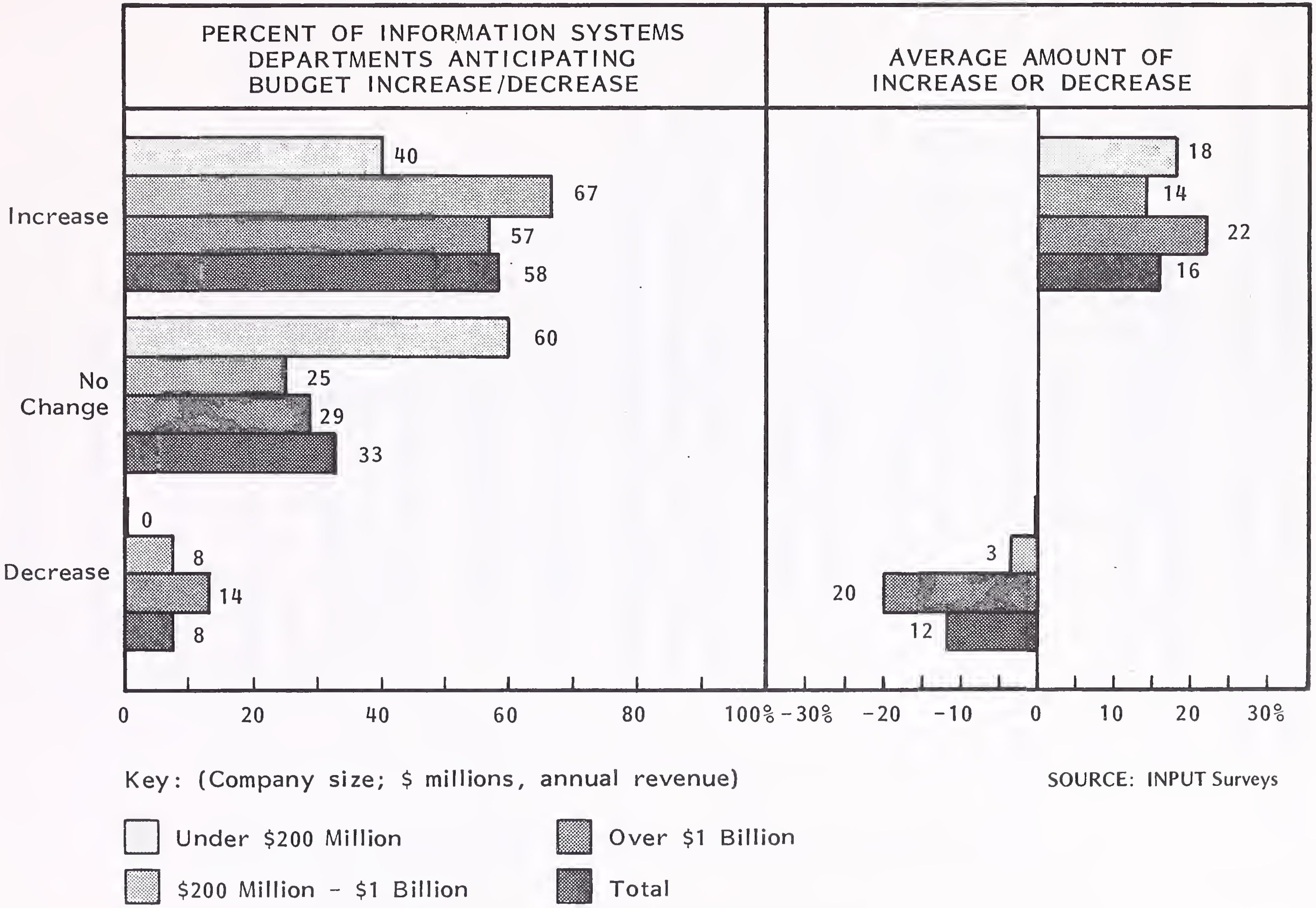
H. DISTRIBUTION SECTOR

1. BUDGETS

- In this sector 58% of the companies expect budget increases in 1983, compared to 61% generally; 8% expect a decrease as do 8% generally, as shown in Exhibit III-130.
  - Companies expecting to increase their budgets foresee an average rise of 16%.
  - Companies anticipating decreases expect their budgets to drop by 12%.
- The budget increases expected vary by company size.
  - Large companies: 57% expect increases in the distribution sector, compared to 63% for large companies generally.
  - Medium companies: 67% expect increases, compared to 63% for medium companies generally.
  - Small companies: 40% expect increases, compared to 57% for small companies generally.
- The average budget growth expected for 1983 in the distribution sector is 9%, compared to 12% in 1982.
  - This represents a decline of 31% in the average rate of growth.

EXHIBIT III-130

ANTICIPATED BUDGET INCREASES FOR 1983 IN THE DISTRIBUTION SECTOR



SOURCE: INPUT Surveys

- Exhibit III-131 shows the range of ratios between the IS budget and the company's total revenues which exist in the distribution sector.

  - The IS percentage of total revenues for the average company (i.e., at the 50th percentile) in each size group was:

    - For large companies: 0.3%, compared to 0.55% for this size company generally.

    - For medium companies: 0.8%, compared to 0.8% for this size company generally.

    - For small companies: 0.4%, compared to 1.2% for this size company generally.

  - The companies that spend least on data processing as a percentage of revenues are those at and below the 20th percentile. Taking the 10th percentile as representative, their IS spending percentages were:

    - Large companies: 0.1%.

    - Medium companies: 0.2%.

    - Small companies: 0.1%.

  - The companies that spend the most on data processing as a percentage of revenue are those at and above the 80th percentile. Taking the 90th percentile as representative, their IS spending percentages were:

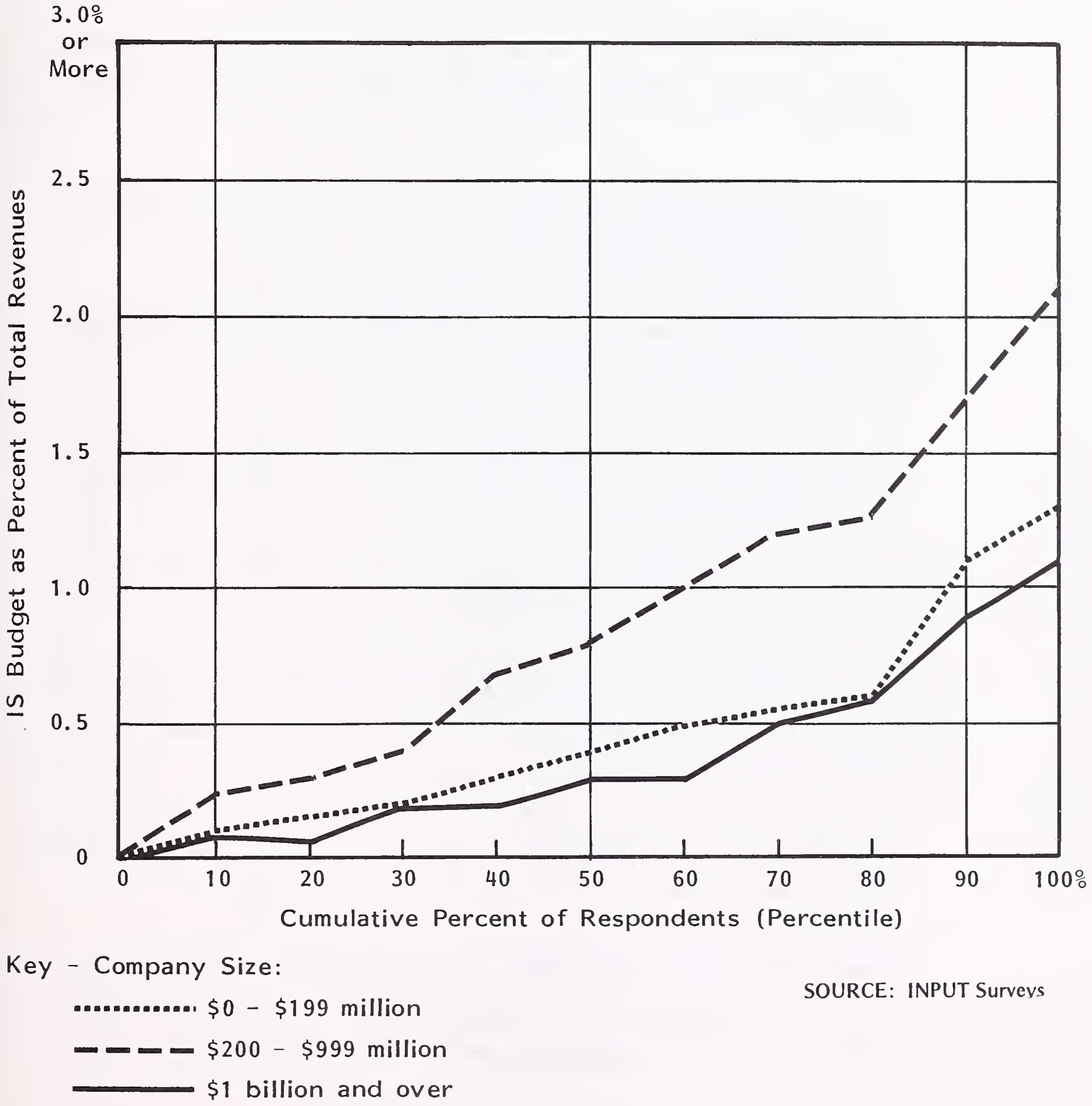
    - Large companies: 0.9%.

    - Medium compnaies: 1.7%.

    - Small companies: 1.1%.

EXHIBIT III-131

INFORMATION SYSTEMS BUDGET AS A PERCENT OF TOTAL REVENUES IN THE DISTRIBUTION SECTOR



SOURCE: INPUT Surveys

- Median spending on IS per corporate employee was $480. However, there was a broad range of spending ratios, as shown in the diagram in Exhibit III-132.

  - The reasons for this variation were discussed in Chapter II, Section B.

2. STAFFING

- In the distribution sector 74% of companies expect their IS staffs to increase in the next 12 months, compared to the industry average of 58%, as shown in Exhibit III-133.

  - The net increase in numbers of staff is expected to be 2%, compared to the all-industry average of 4%.

- Turnover in this sector is expected to be over twice as high as the all-industry average in 1983, as shown in Exhbit II-9.

  - Current turnover rates for individual positions are shown in Exhibit III-134. For technical positions the turnover rate has been especially high.

- Difficulty in recruiting staff in this sector is considerably higher than the all-industry average, as shown in Exhibit III-135.

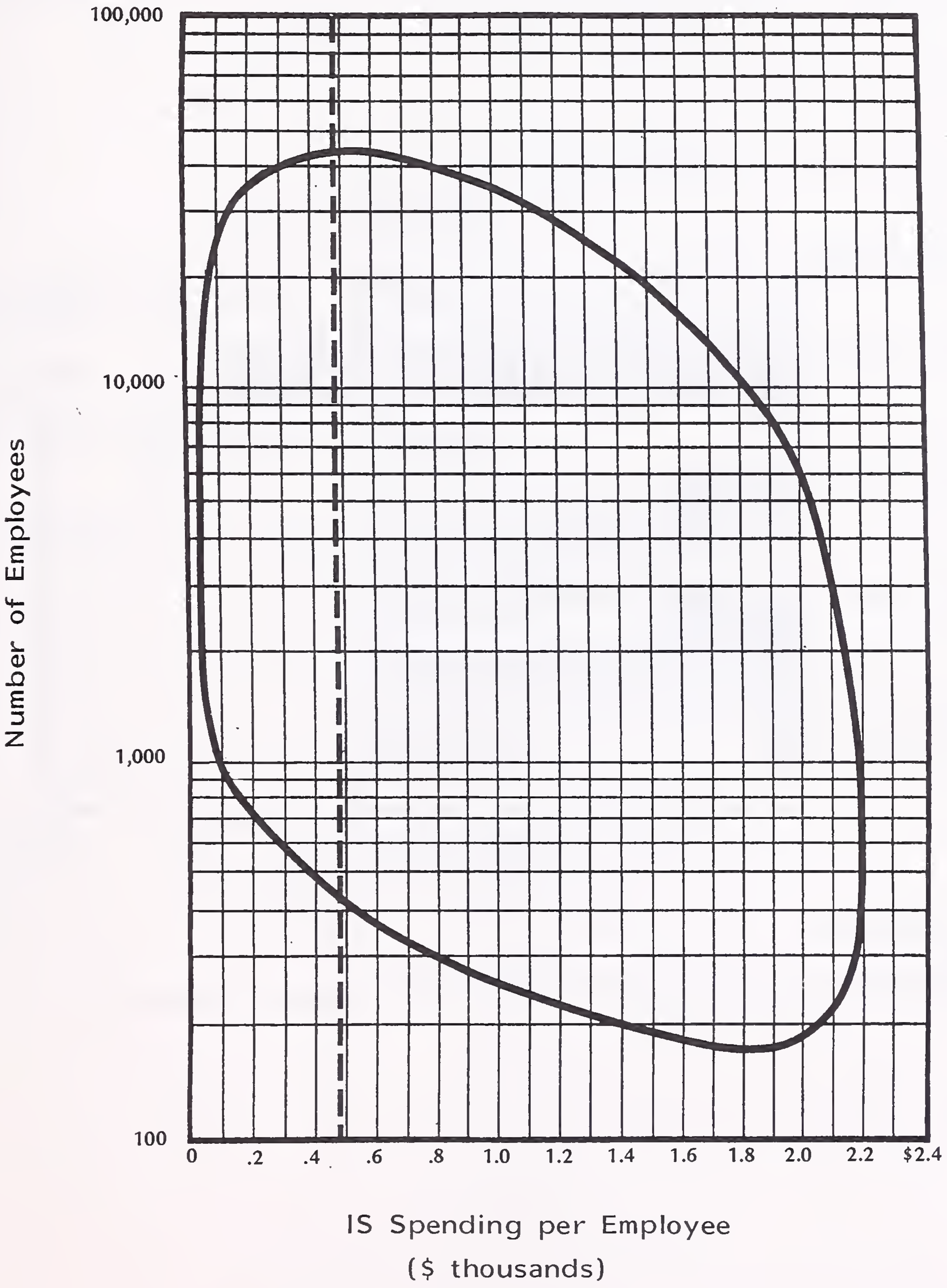
- The number of programs to be maintained averages 850 in this sector, although the range, both in absolute numbers and based on company size, is quite broad, as shown in Exhibit III-136.

  - Maintenance, as a proportion of total workload, is very close to the all-industry average and is stable, as shown in Exhibit III-137.

  - Company size does play a strong role in maintenance workload, with the small companies having an especially high proportion of maintenance. The large companies are seeing their maintenance percentage

EXHIBIT III-132

INFORMATION SYSTEMS SPENDING PER EMPLOYEE BY COMPANY SIZE IN THE DISTRIBUTION SECTOR

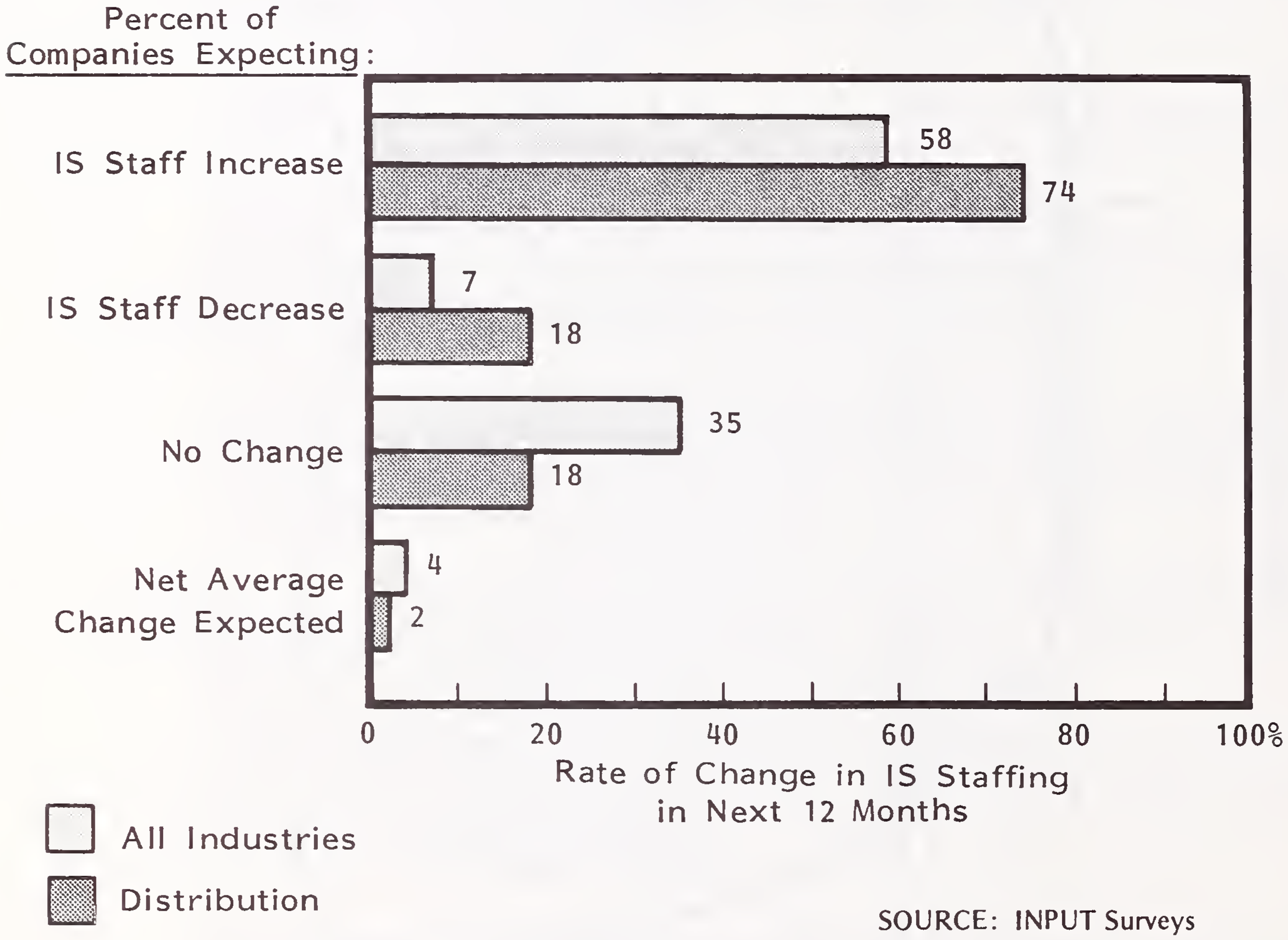


---- = Median

SOURCE: INPUT Surveys

EXHIBIT III-133

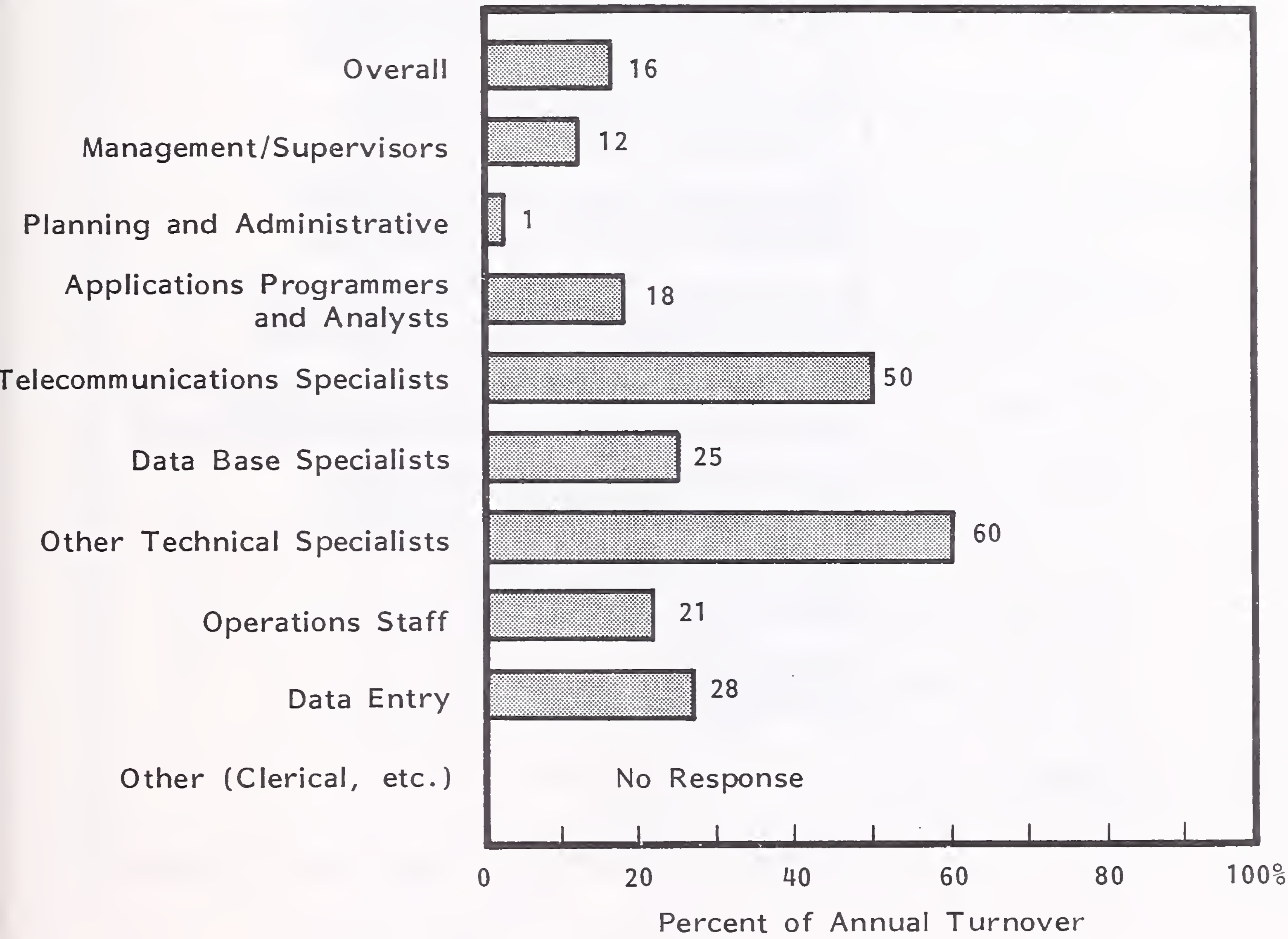
INFORMATION SYSTEMS STAFFING CHANGES EXPECTED IN THE NEXT TWELVE MONTHS IN THE DISTRIBUTION SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-134

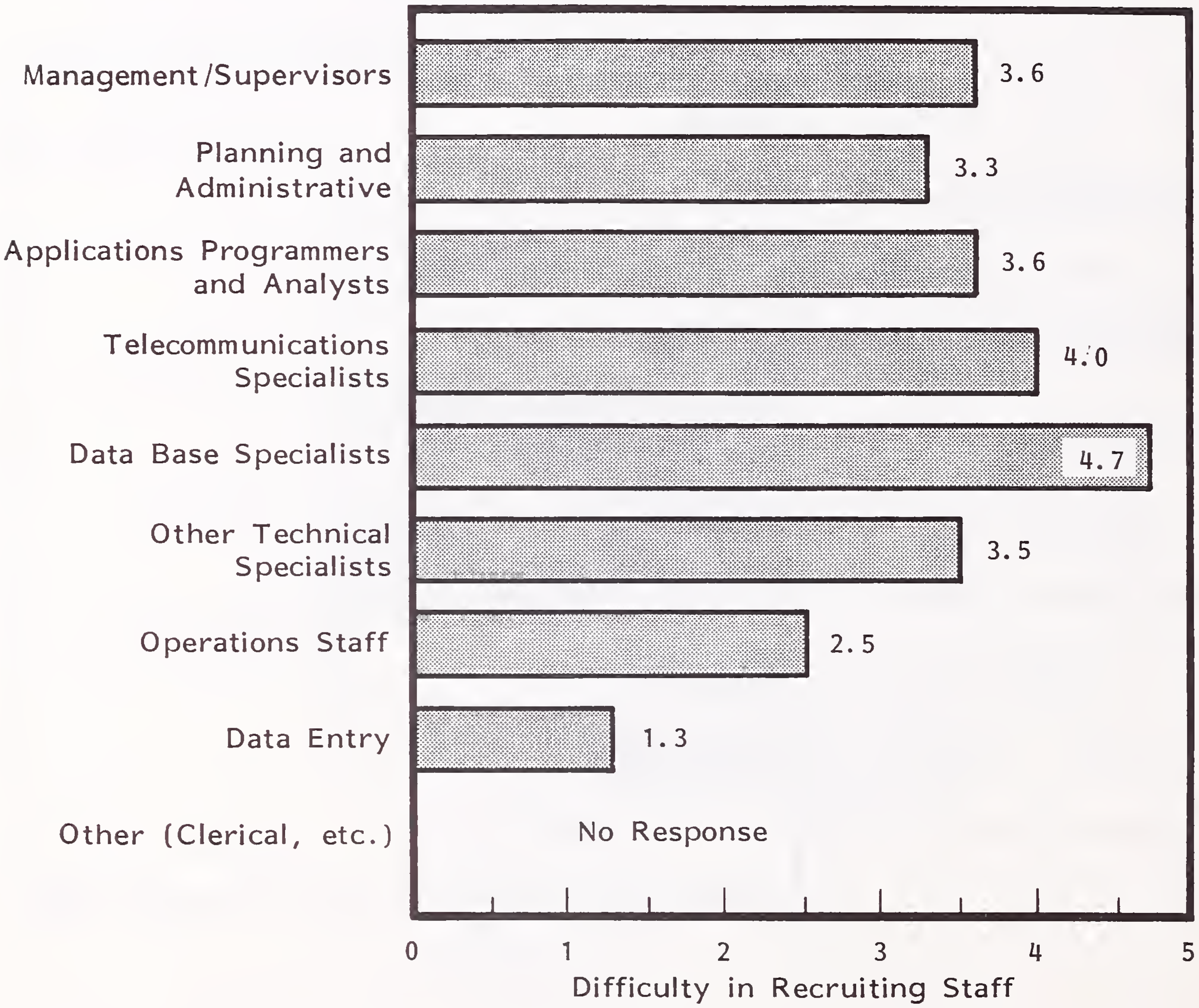
INFORMATION SYSTEMS STAFFING CURRENT ANNUAL TURNOVER IN THE DISTRIBUTION SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-135

INFORMATION SYSTEMS DIFFICULTY IN RECRUITING STAFF IN THE DISTRIBUTION SECTOR

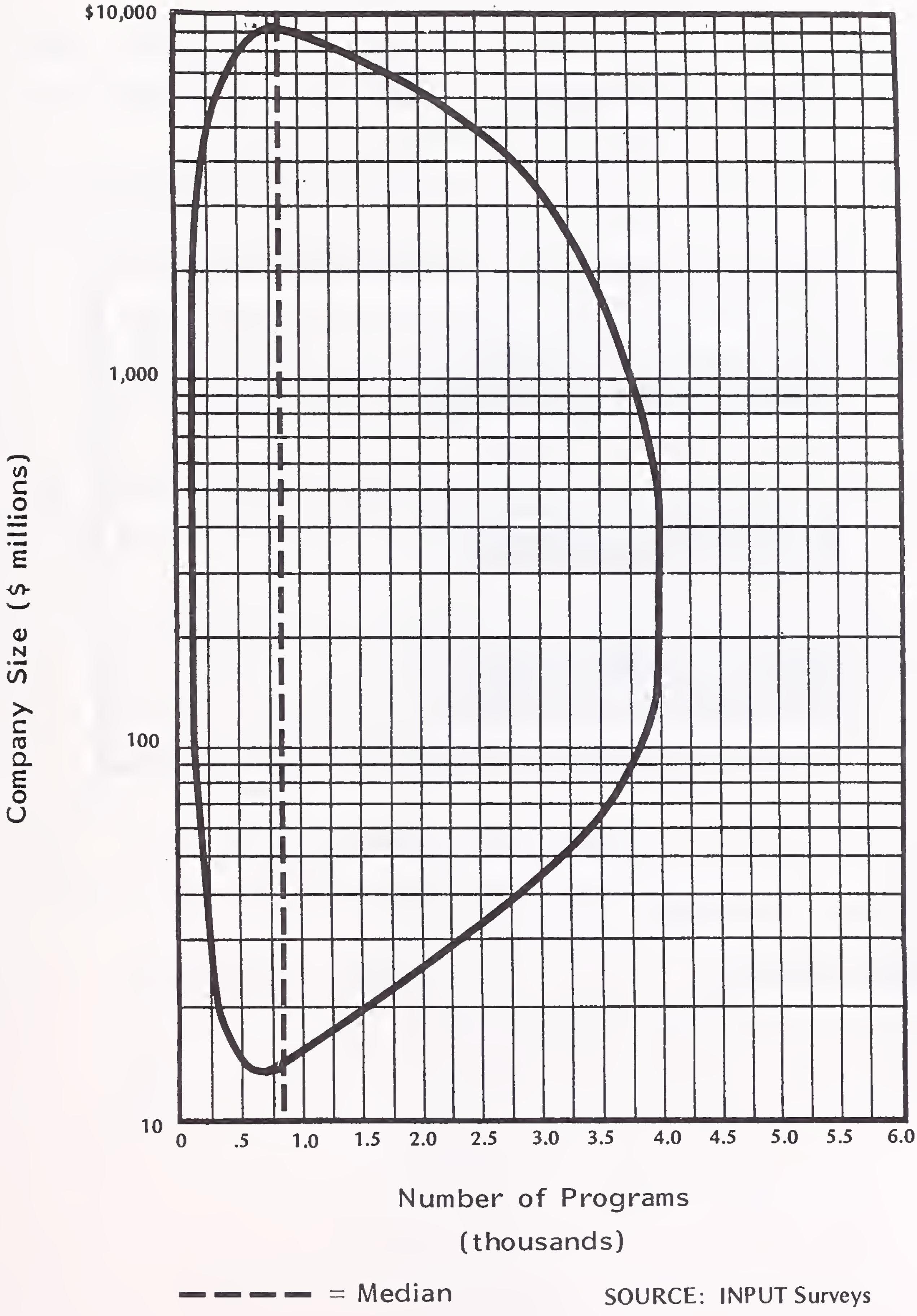


Scale: 1 = Low, 5 = High

SOURCE: INPUT Surveys

EXHIBIT III-136

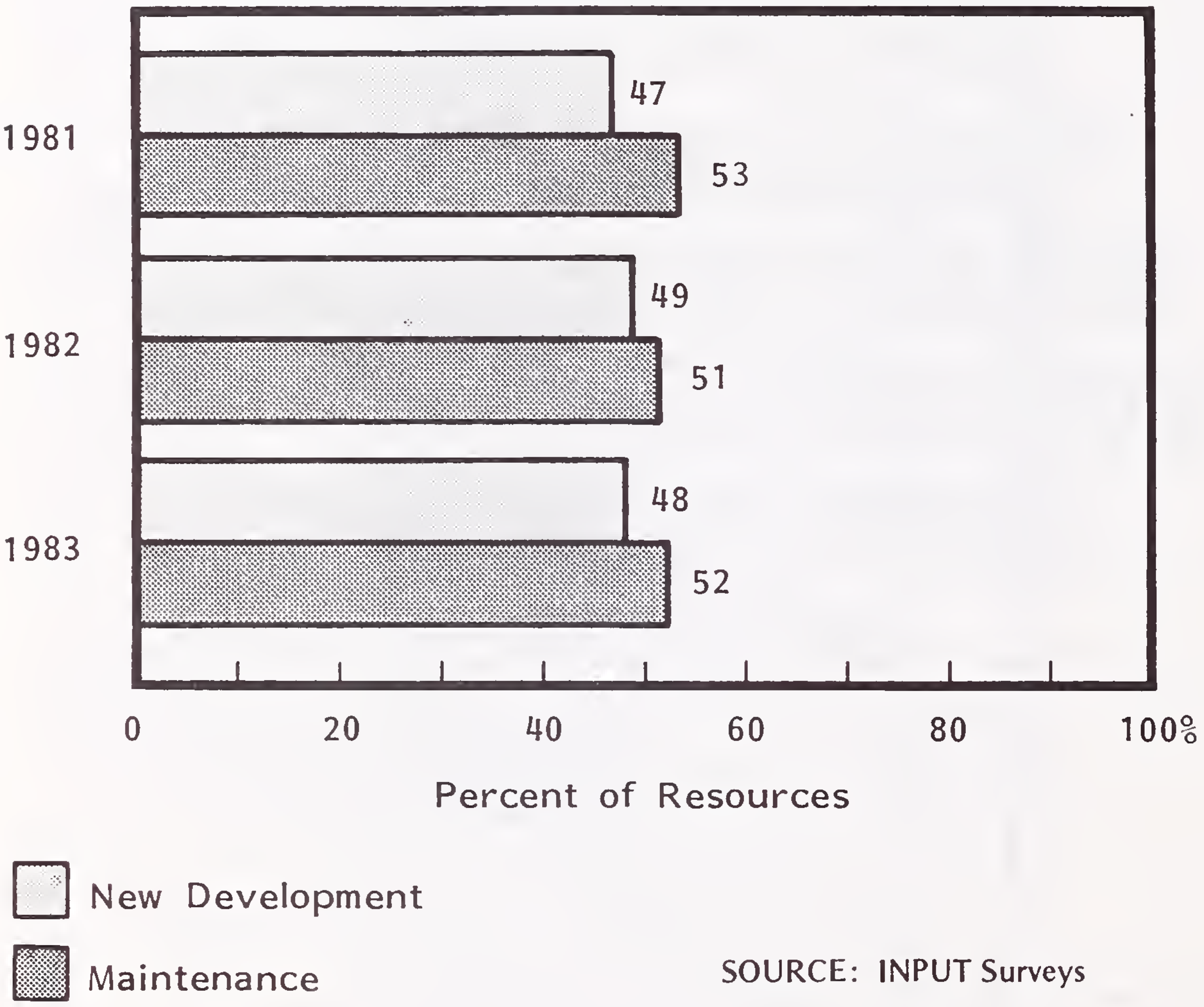
NUMBER OF PROGRAMS BY COMPANY SIZE IN THE DISTRIBUTION SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-137

NEW PROGRAM DEVELOPMENT VERSUS MAINTENANCE IN THE DISTRIBUTION SECTOR, 1981-1983



SOURCE: INPUT Surveys

increase as mature systems respond to new needs, as shown in Exhibit III-138.

3. INFORMATION SYSTEMS ISSUES

- Note: please refer to Chapter II, Section D for a general discussion of IS problems, objectives, and initiatives and their interrelationships.

- The distribution sector sees its major problems in the personnel area, as shown in Exhibit III-139. This is directly related to its significant turnover problems.

  - More detailed information about specific problem areas is contained in Exhibit III-140. This exhibit shows the percentage of companies in this sector which regard an issue as a major problem.

- The distribution sector's objectives are very close to the all-industry norm, as shown in Exhibit III-141.

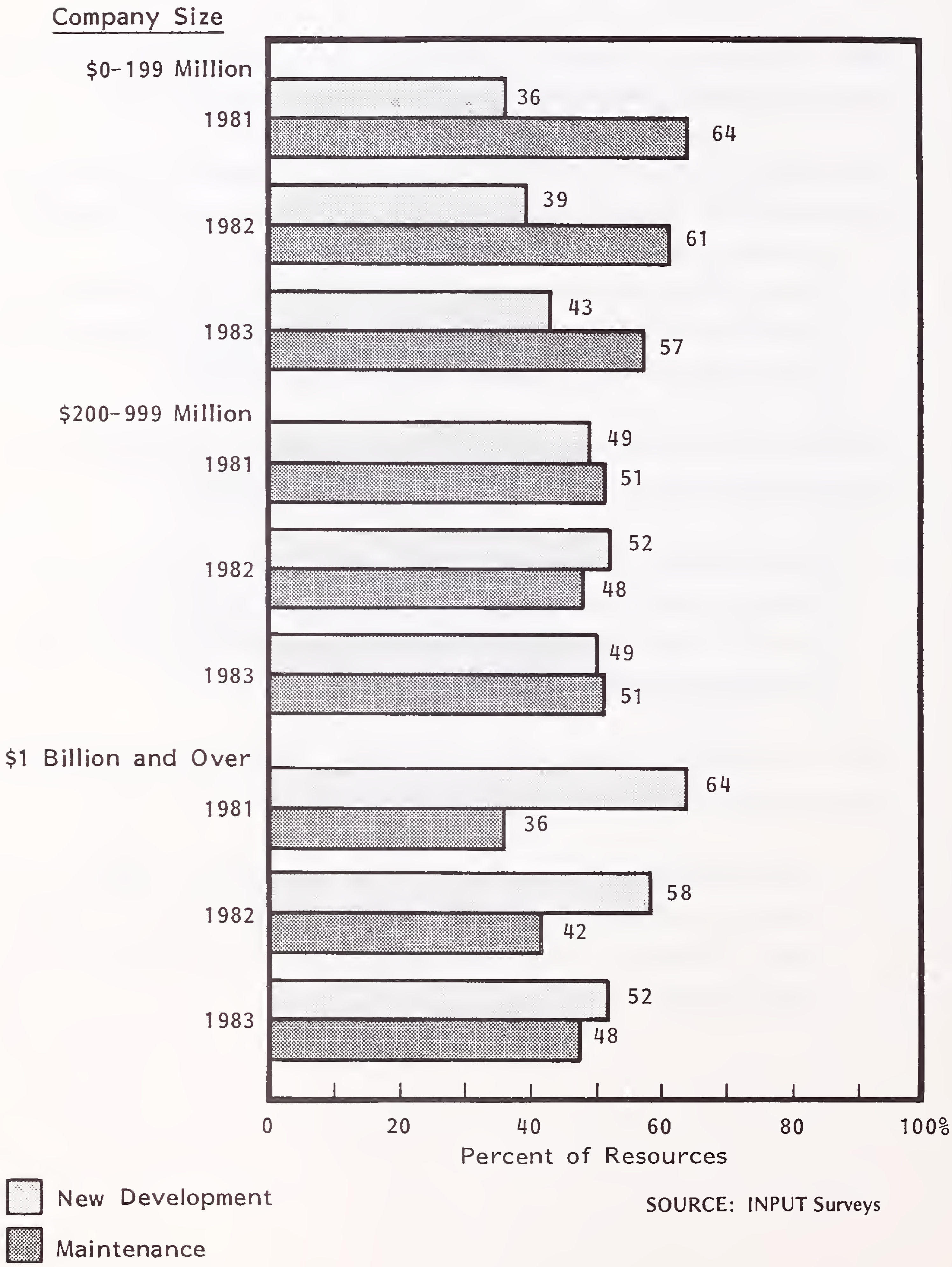
  - More detailed information about specific planning objectives is contained in Exhibit III-142. This exhibit shows the percentage of companies in this sector which have identified particular planning objectives as being of major importance to them.

- Only in the personnel area does the distribution sector have more planned initiatives than average, as shown in Exhibit III-143.

  - More detailed information about specific areas where an initiative is planned is contained in Exhibit III-144. This exhibit shows the percentage of companies in this sector which plan a major initiative in a particular area.

EXHIBIT III-138

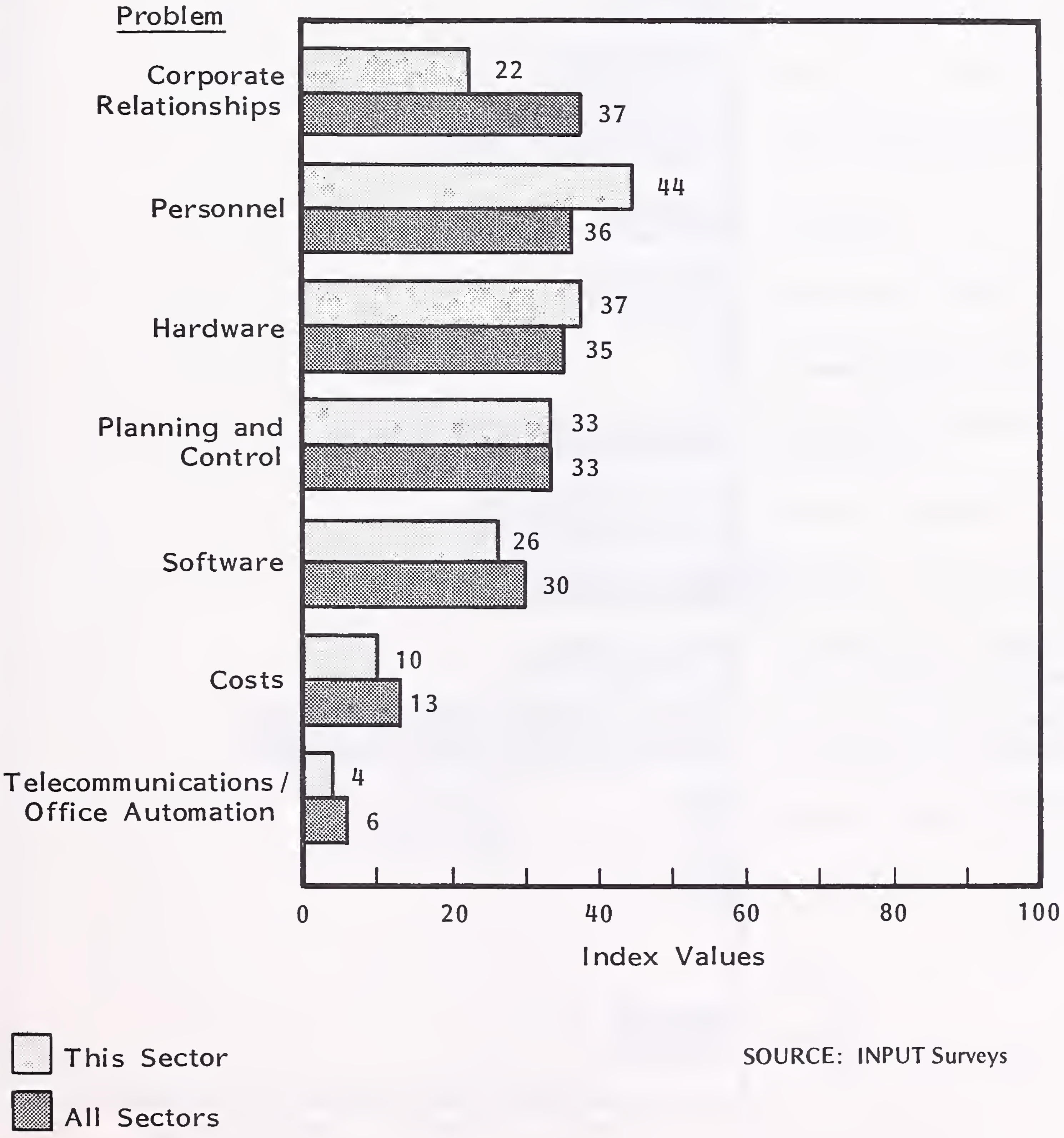
NEW PROGRAM DEVELOPMENT VERSUS MAINTENANCE IN THE DISTRIBUTION SECTOR, 1981-1983



SOURCE: INPUT Surveys

EXHIBIT III-139

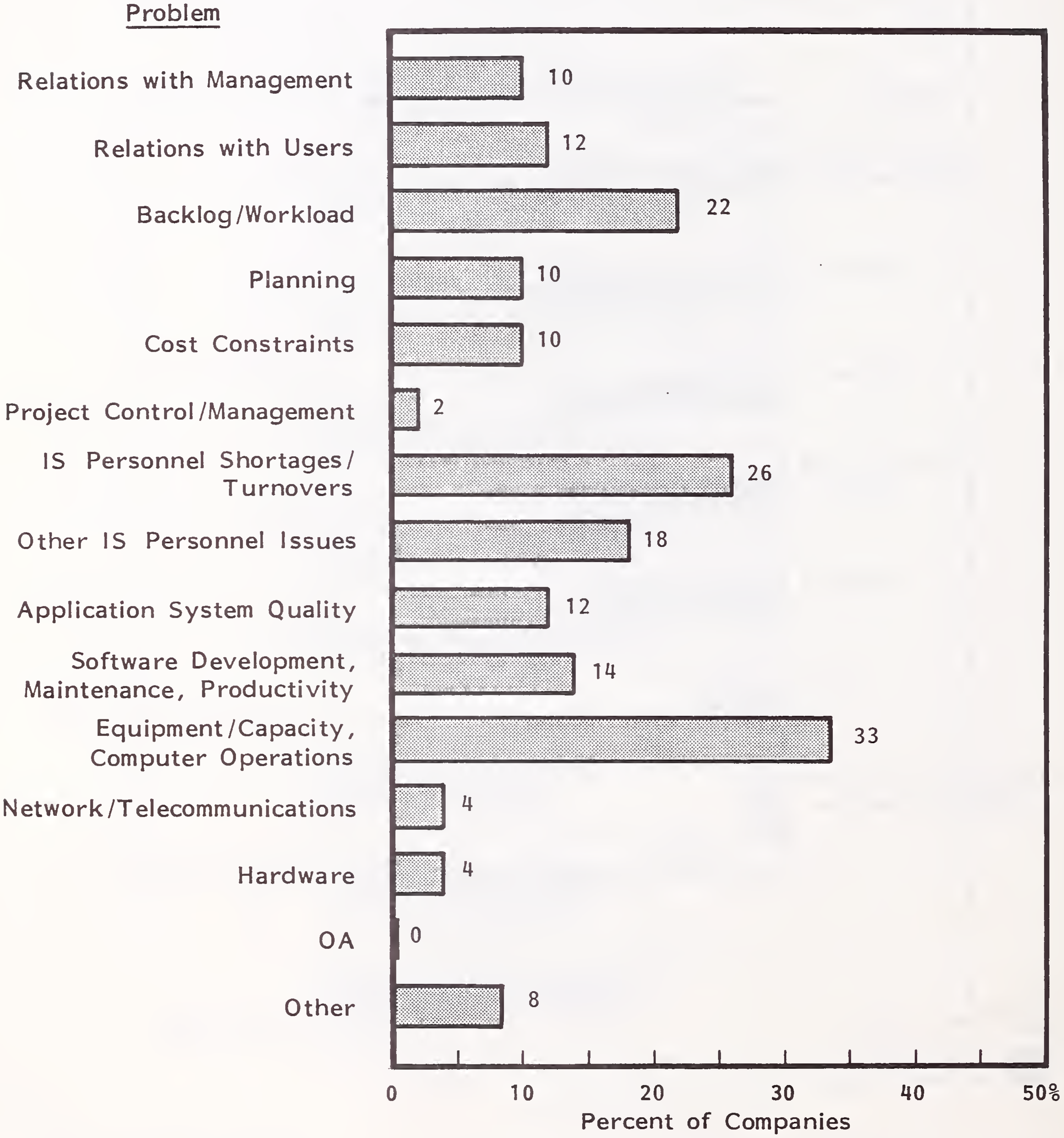
INFORMATION SYSTEMS PROBLEMS IN THE DISTRIBUTION SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-140

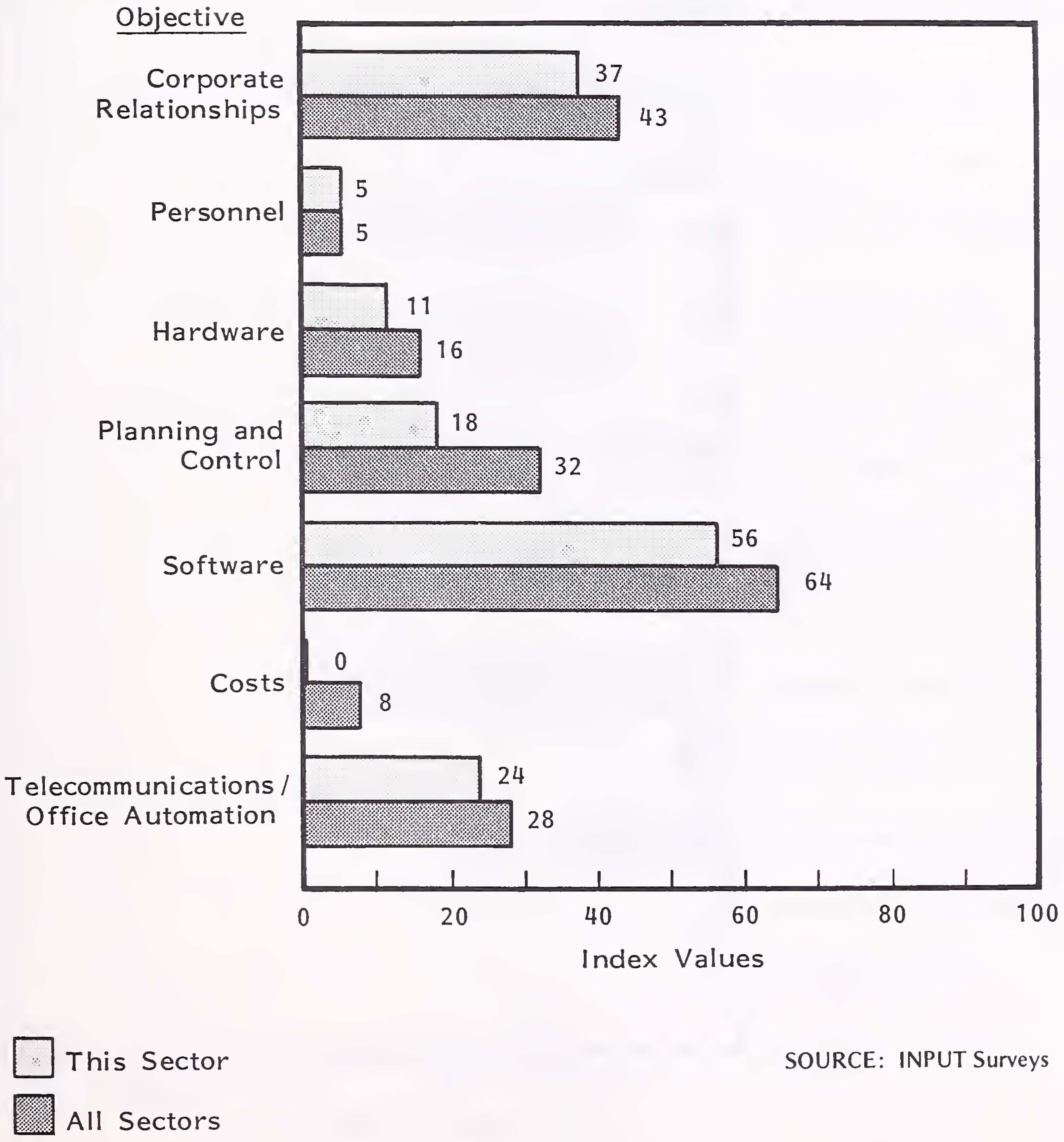
INFORMATION SYSTEMS PROBLEMS IN THE DISTRIBUTION SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-141

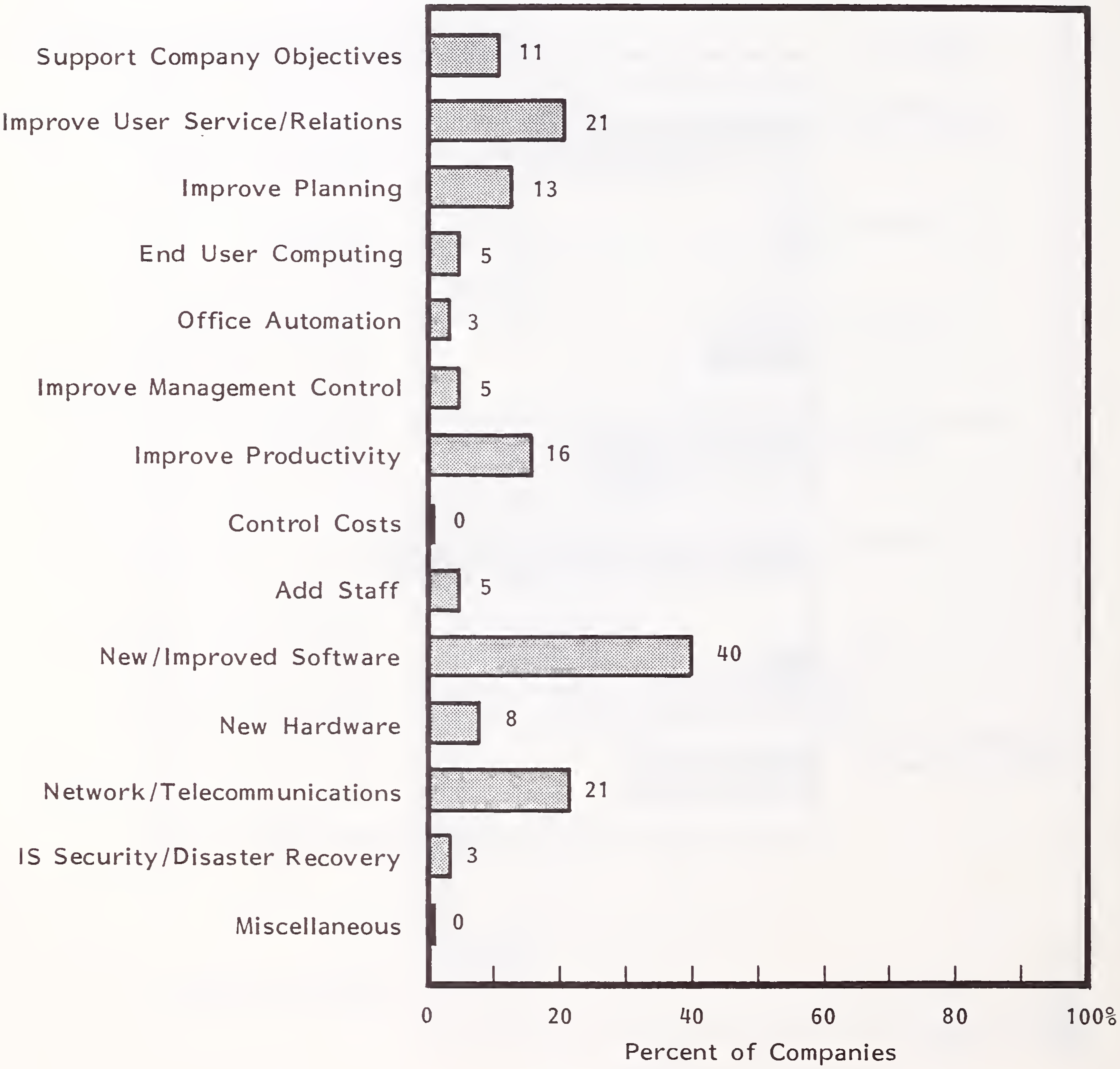
INFORMATION SYSTEMS OBJECTIVES IN THE DISTRIBUTION SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-142

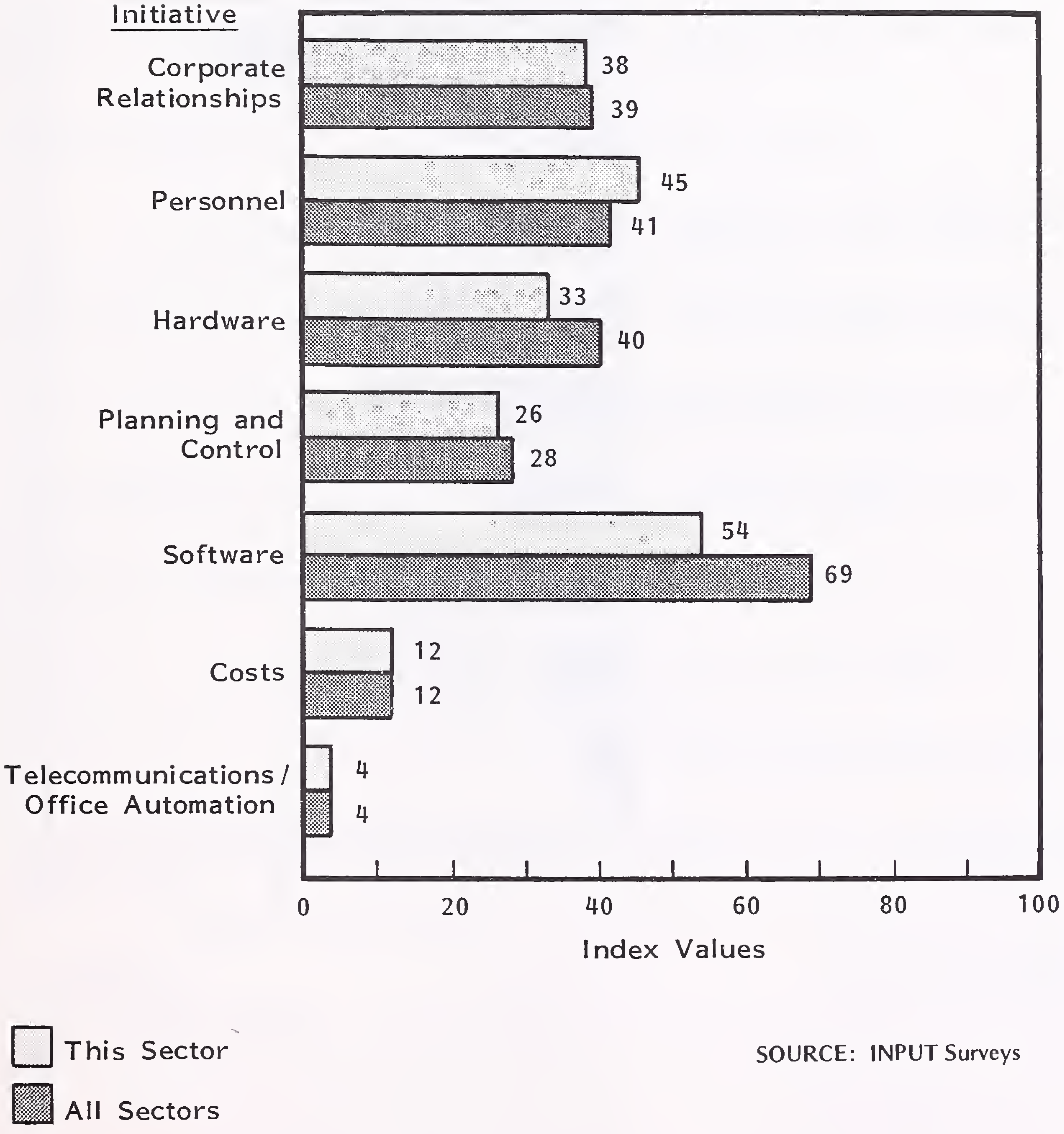
INFORMATION SYSTEMS OBJECTIVES IN THE DISTRIBUTION SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-143

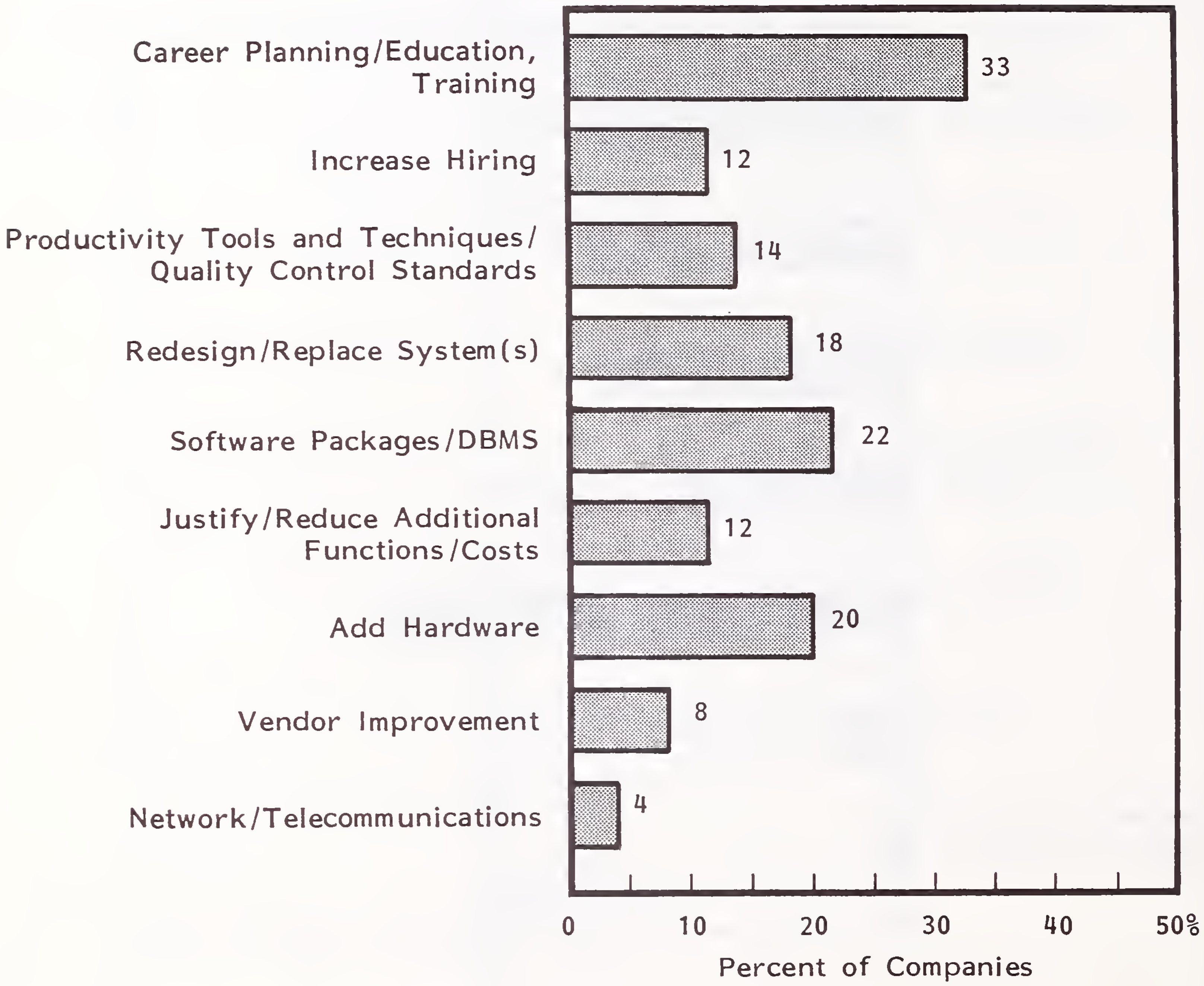
INFORMATION SYSTEMS INITIATIVES IN THE DISTRIBUTION SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-144

INFORMATION SYSTEMS INITIATIVES PLANNED IN THE DISTRIBUTION SECTOR

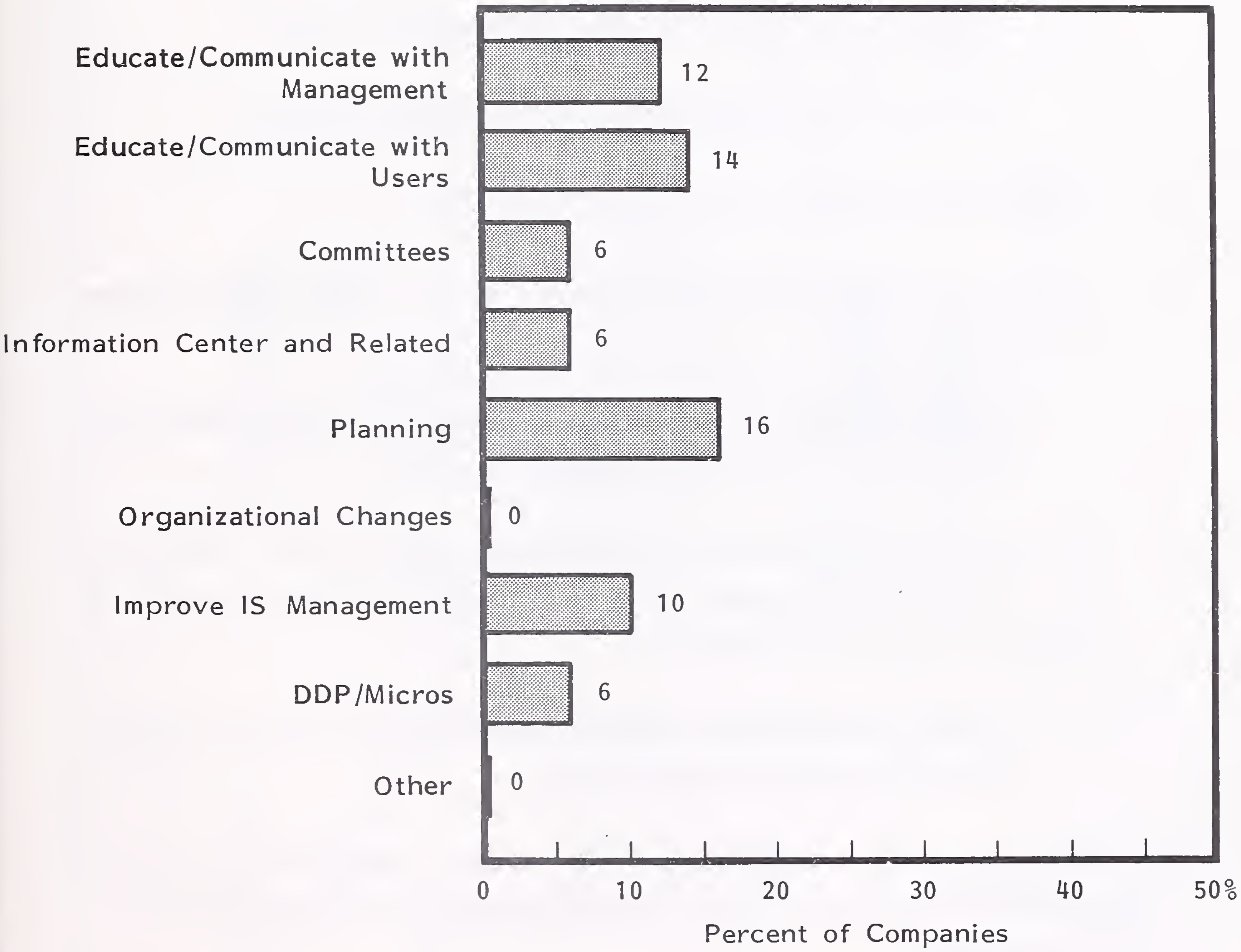


Continued

SOURCE: INPUT Surveys

EXHIBIT III-144 (Cont.)

INFORMATION SYSTEMS INITIATIVES PLANNED IN THE DISTRIBUTION SECTOR



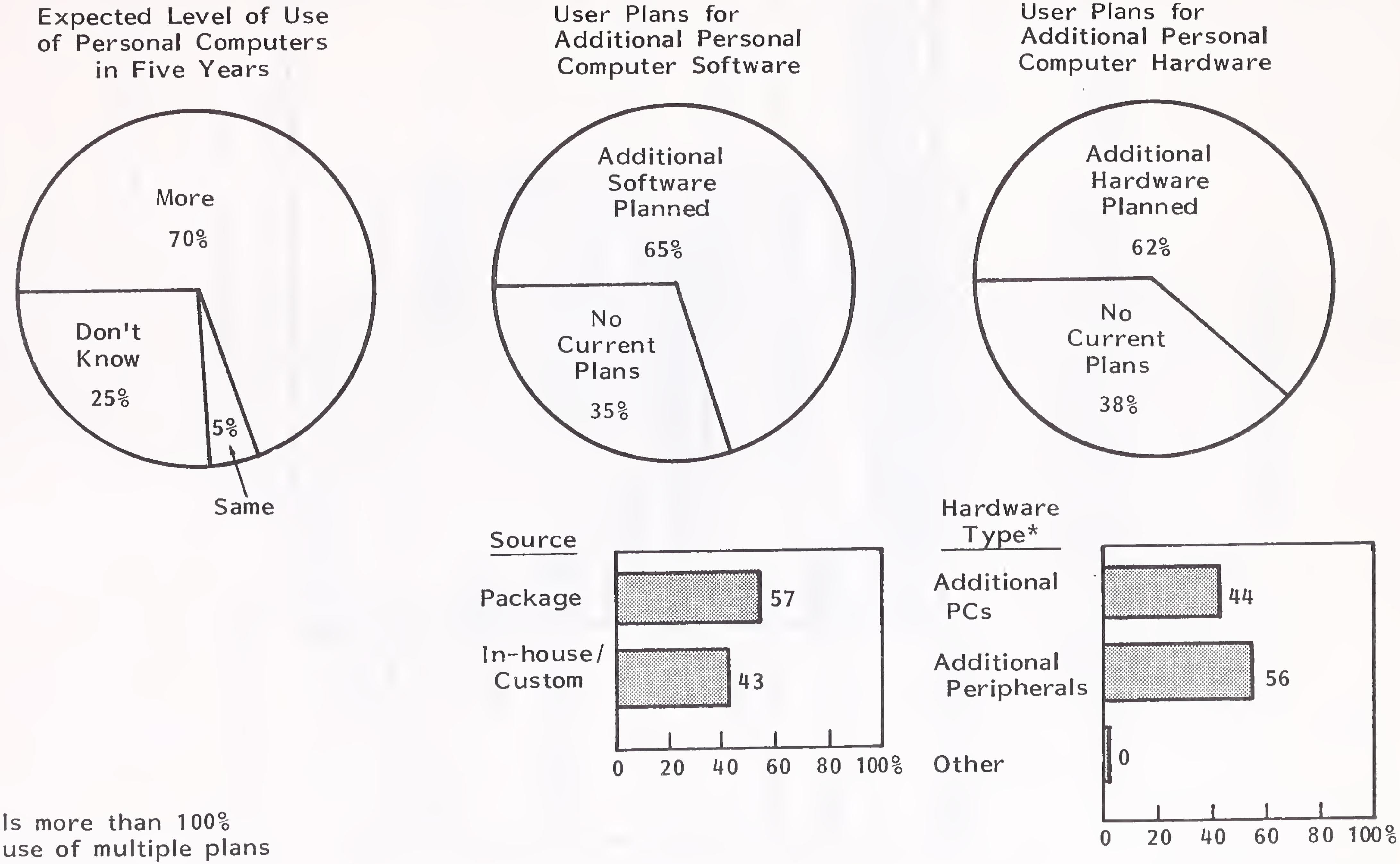
SOURCE: INPUT Surveys

4. PERSONAL COMPUTERS

- Plans for the use of personal computers in this sector are shown in Exhibit III-145 and include:
  - The overall level of use in five years.
  - Plans for obtaining additional personal computer software.
  - Plans for obtaining additional personal computer hardware.
- These plans are similar to the all-industry average.
- Exhibit III-146 shows the types of personal computer software packages now used.
  - The "Calcs" and business planning packages are even more important in the distribution sectors than they are generally.
- The general categories of applications used are summarized in Exhibit III-147. The type of applications that personal computers are being used for is similar to that in industry generally.
  - Exhibit III-148 provides examples of actual personal computer applications in use in the distribution sector.
- Compared to the average user, personal computer users in this sector are somewhat more likely to rely on the IS department for assistance, as shown in Exhibit III-149.
- In this sector 79% of departments using personal computers have had their installation less than a year, as shown in Exhibit III-150, compared to 78% generally.

EXHIBIT III-145

PERSONAL COMPUTER ACQUISITION PLANS IN THE DISTRIBUTION SECTOR



Expected Level of Use of Personal Computers in Five Years

User Plans for Additional Personal Computer Software

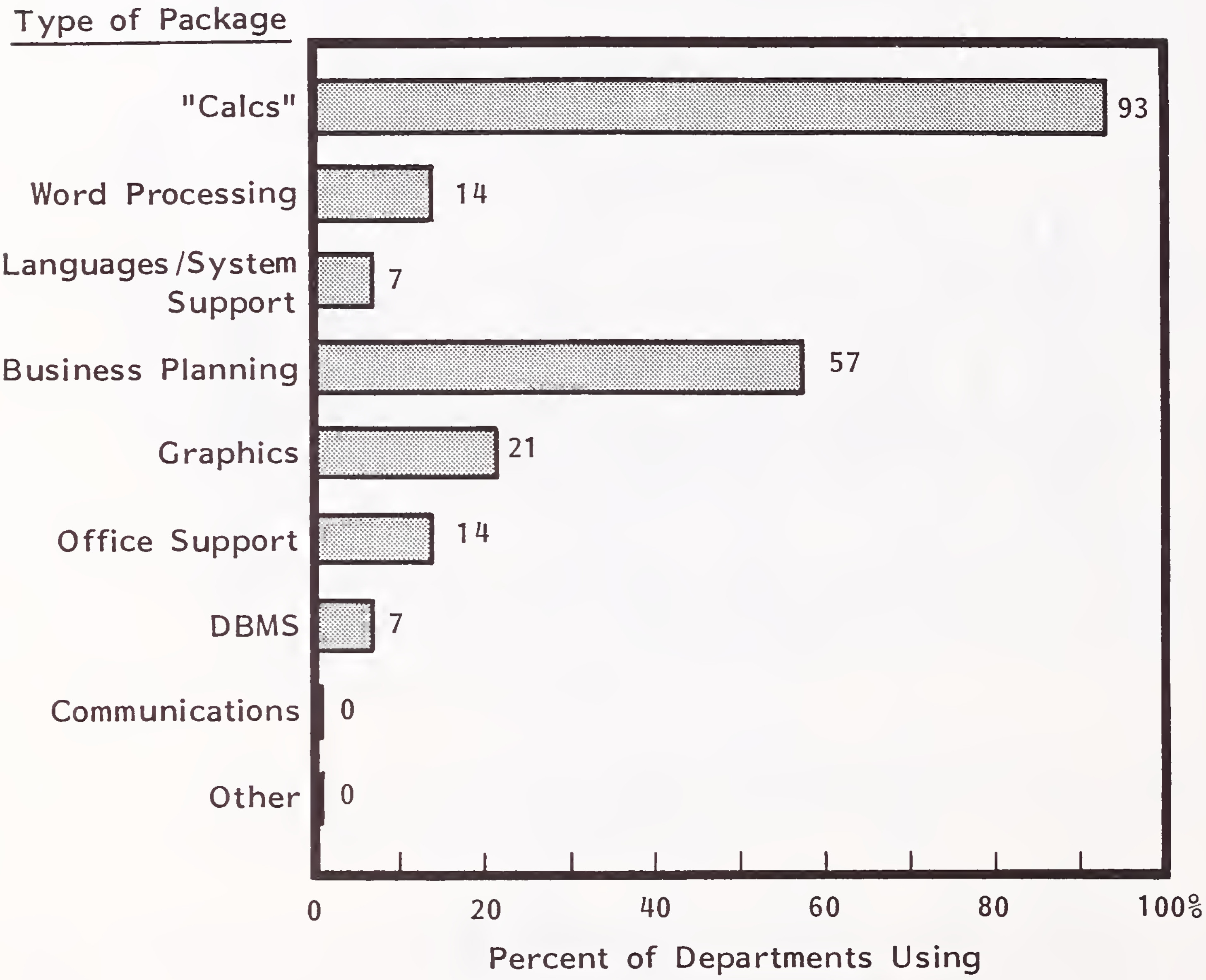
User Plans for Additional Personal Computer Hardware

* Totals more than 100% because of multiple plans

SOURCE: INPUT Surveys

EXHIBIT III-146

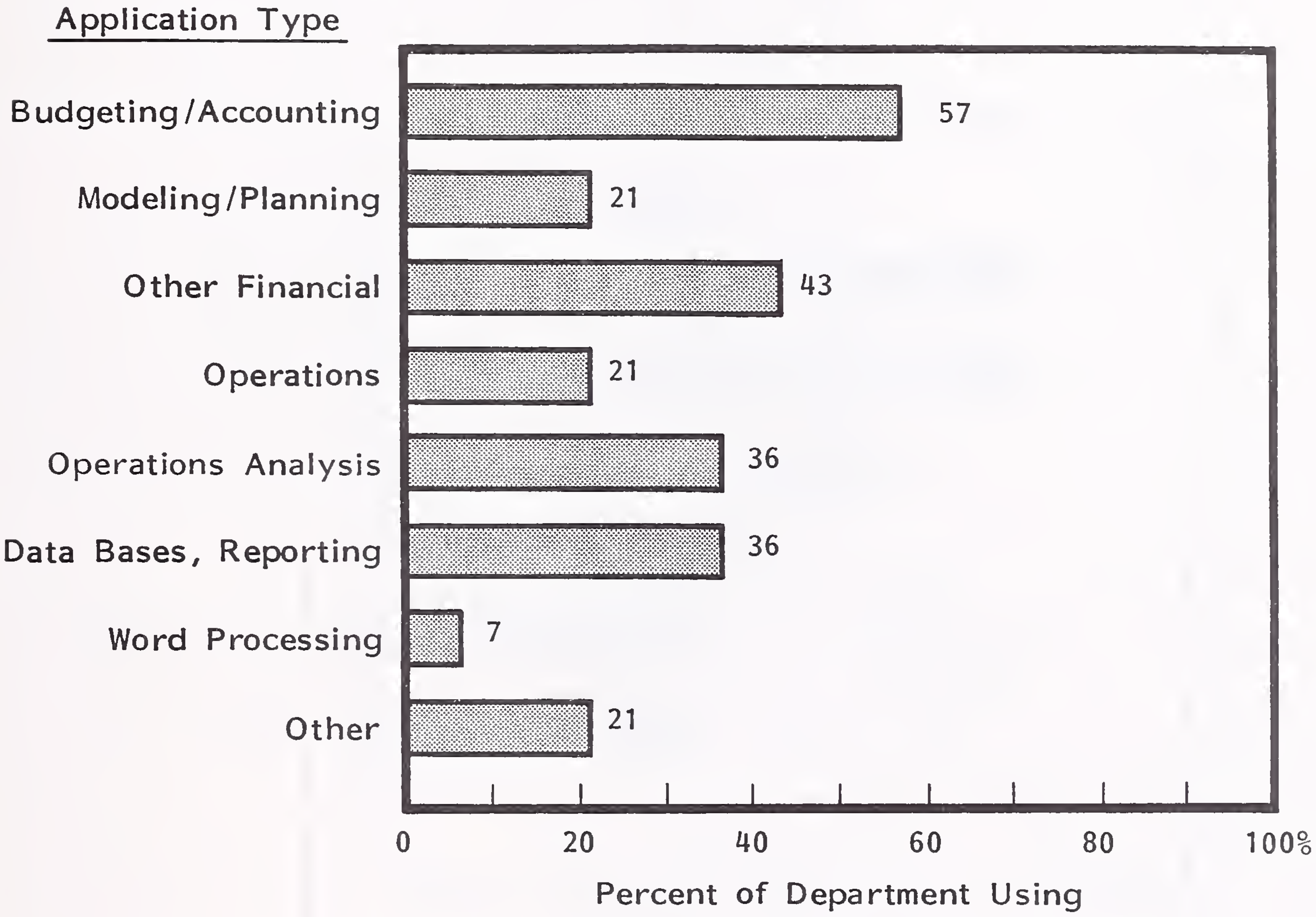
TYPES OF PERSONAL COMPUTER SOFTWARE PACKAGES USED BY THE DISTRIBUTION SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-147

PERSONAL COMPUTER APPLICATIONS IN THE DISTRIBUTION SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-148

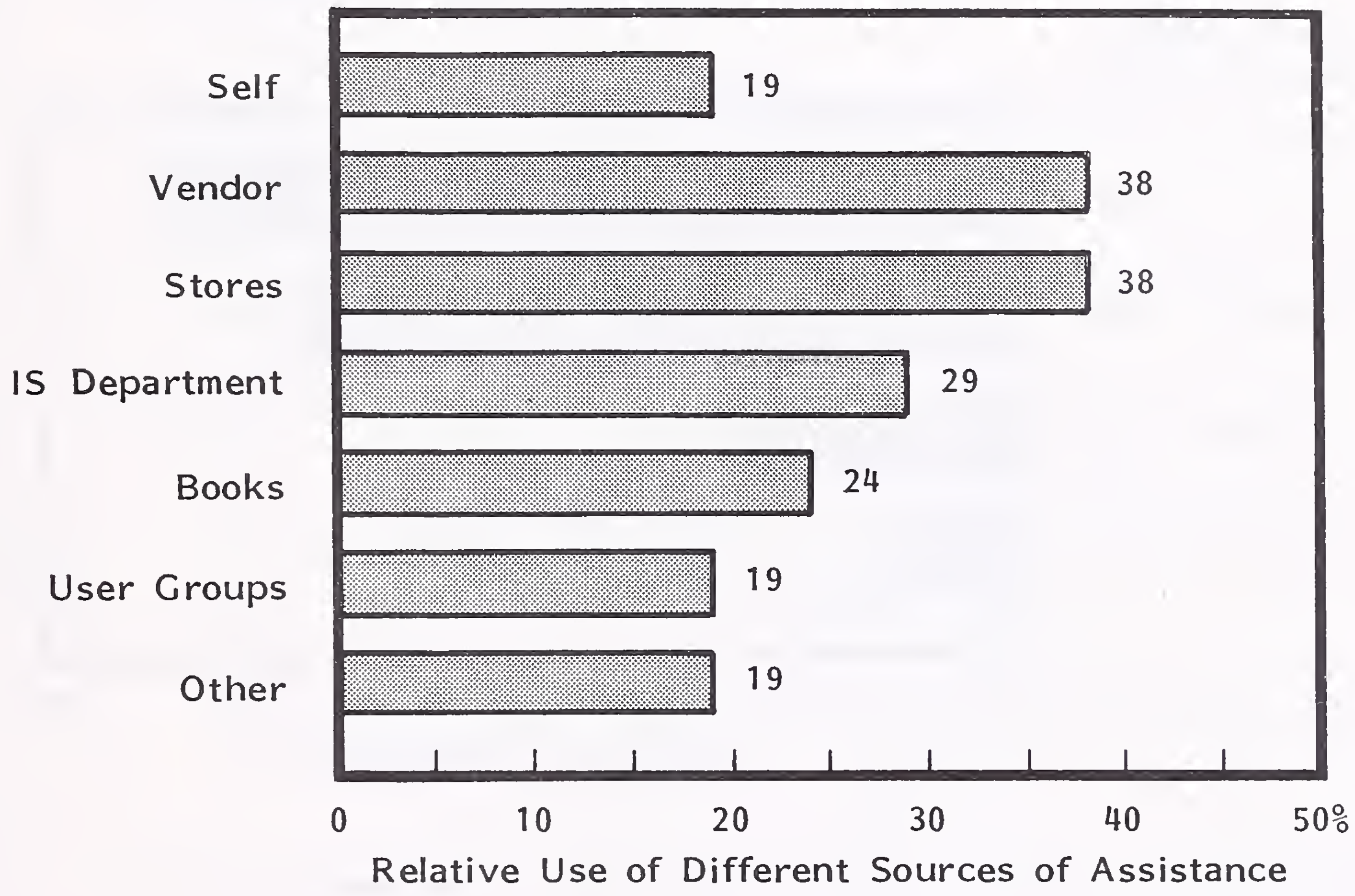
PERSONAL COMPUTER APPLICATIONS IN THE DISTRIBUTION SECTOR

Accounting Analysis
Sales Journal
Cash Management
Microcomputer Purchase Study
Merchandising
Report Writing
Financial Analysis and Planning
Budgeting
Graphics
Debt Servicing
Comparative Analysis
Sales Analysis
Advertising Accounts
Input/Output Device for Analysis
Operating Expenses Analysis
Consolidations Reports
Price Analysis
Inventory
Advertising Results
Cost Benefit Analysis
General Ledger
Word Processing
Annual Plans
Reforecasting
Income Statements

SOURCE: INPUT Surveys

EXHIBIT III-149

SOURCES OF ASSISTANCE FOR PERSONAL COMPUTER USERS IN THE DISTRIBUTION SECTOR

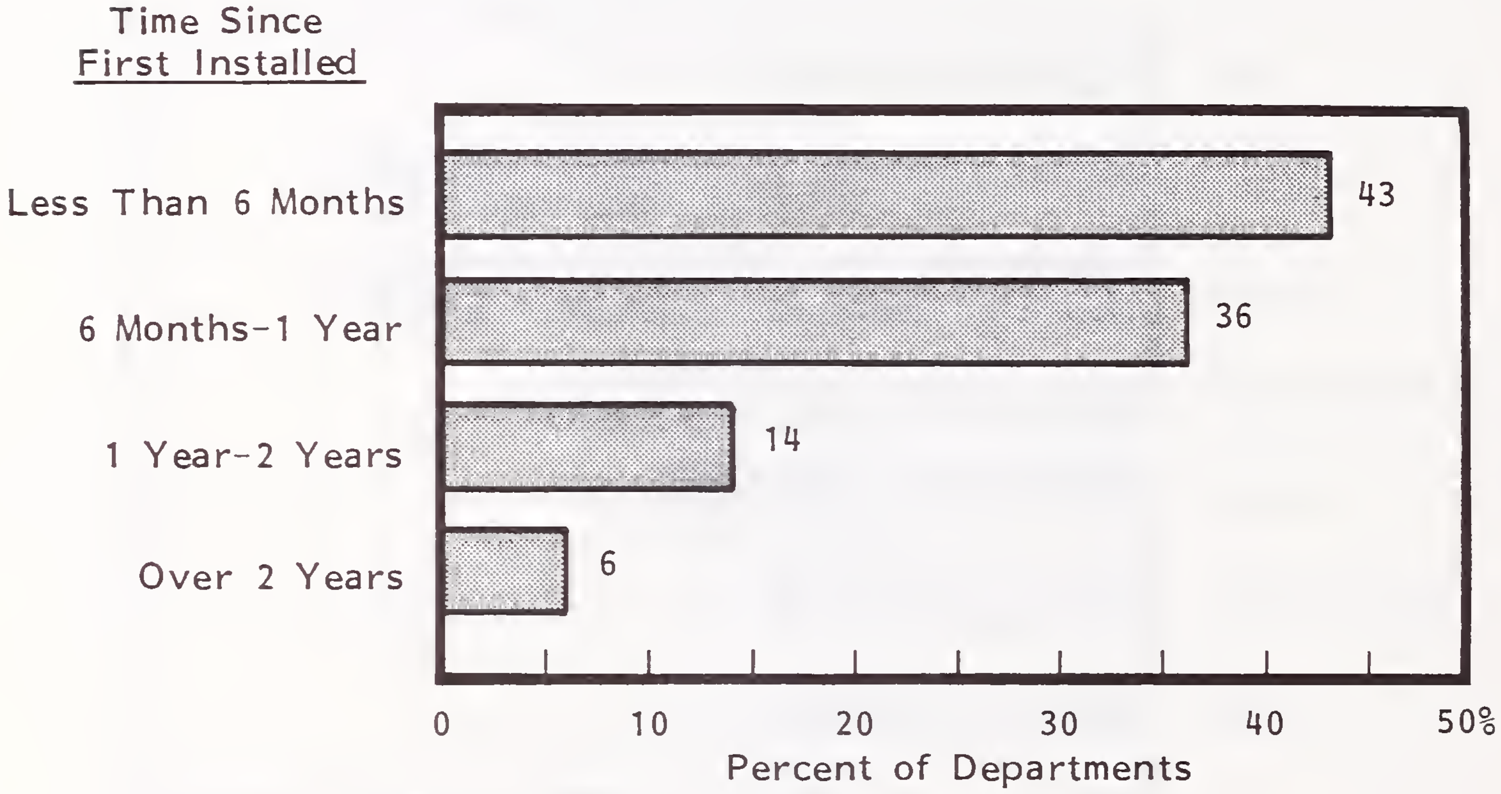


Note: Total Is More Than 100% Because of Multiple Sources.

SOURCE: INPUT Surveys

EXHIBIT III-150

TIME SINCE FIRST PERSONAL COMPUTER INSTALLED IN USER DEPARTMENTS IN THE DISTRIBUTION SECTOR



SOURCE: INPUT Surveys

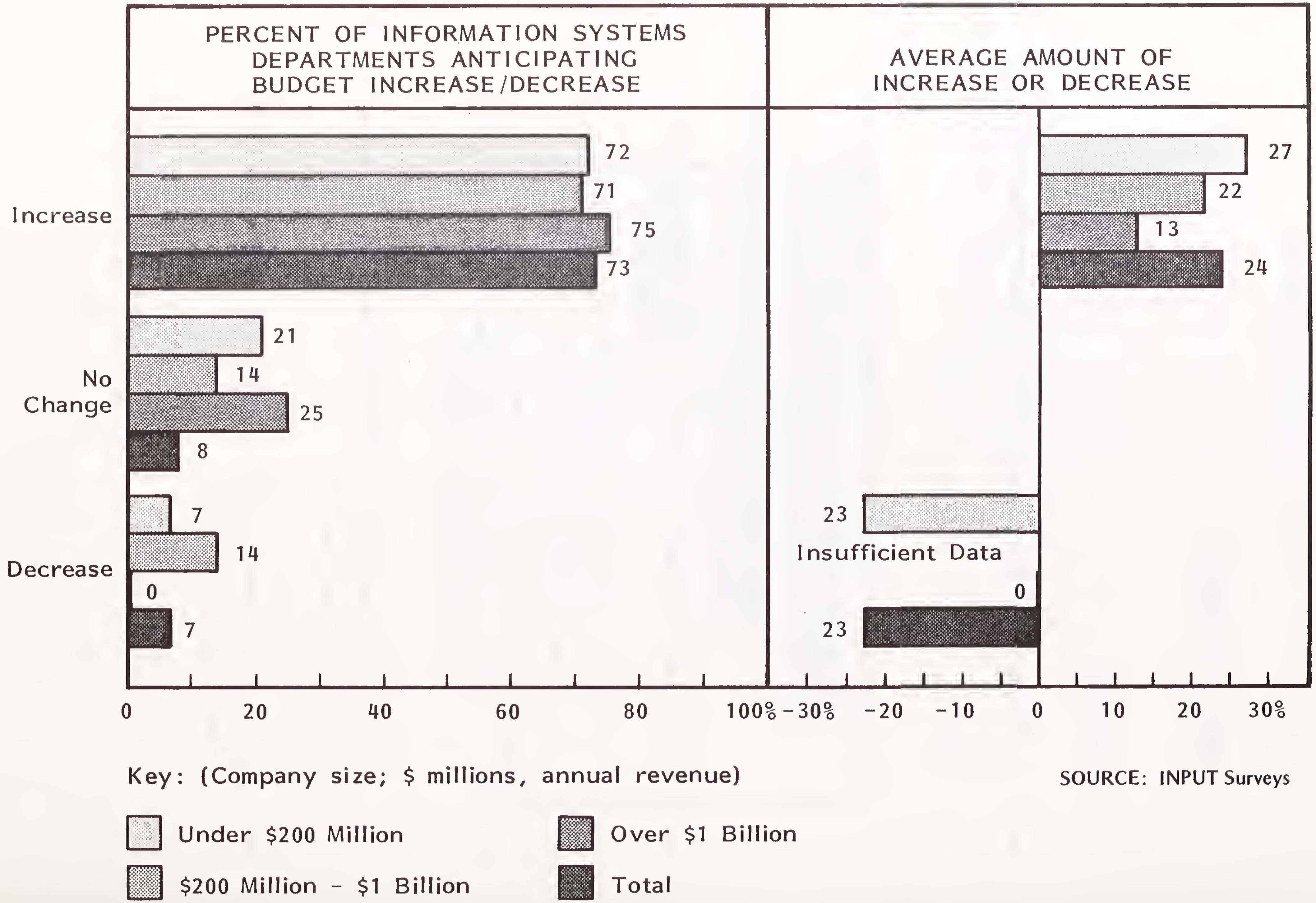
I. SERVICES SECTOR

I. BUDGETS

- In this sector, 73% of the companies expect budget increases in 1983, compared to 61% generally. Seven percent expect a decrease compared to 8% generally, as shown in Exhibit III-151.
  - Companies expecting to increase their budgets foresee an average rise of 24%.
  - Companies anticipating decreases expect their budgets to drop by 24%.
- The budget increases expected do not vary significantly by company size.
  - Large companies: 75% expect increases in the services sector, compared to 63% for large companies generally.
  - Medium companies: 71% expect increases, compared to 63% for medium companies generally.
  - Small companies: 72% expect increases, compared to 57% for small companies generally.
- The average budget growth expected for 1983 in the services sector is 16%, compared to 12% in 1982.
  - This represents an increase of 31% in the average rate of growth.

EXHIBIT III-151

ANTICIPATED BUDGET INCREASES FOR 1983 IN THE SERVICES SECTOR

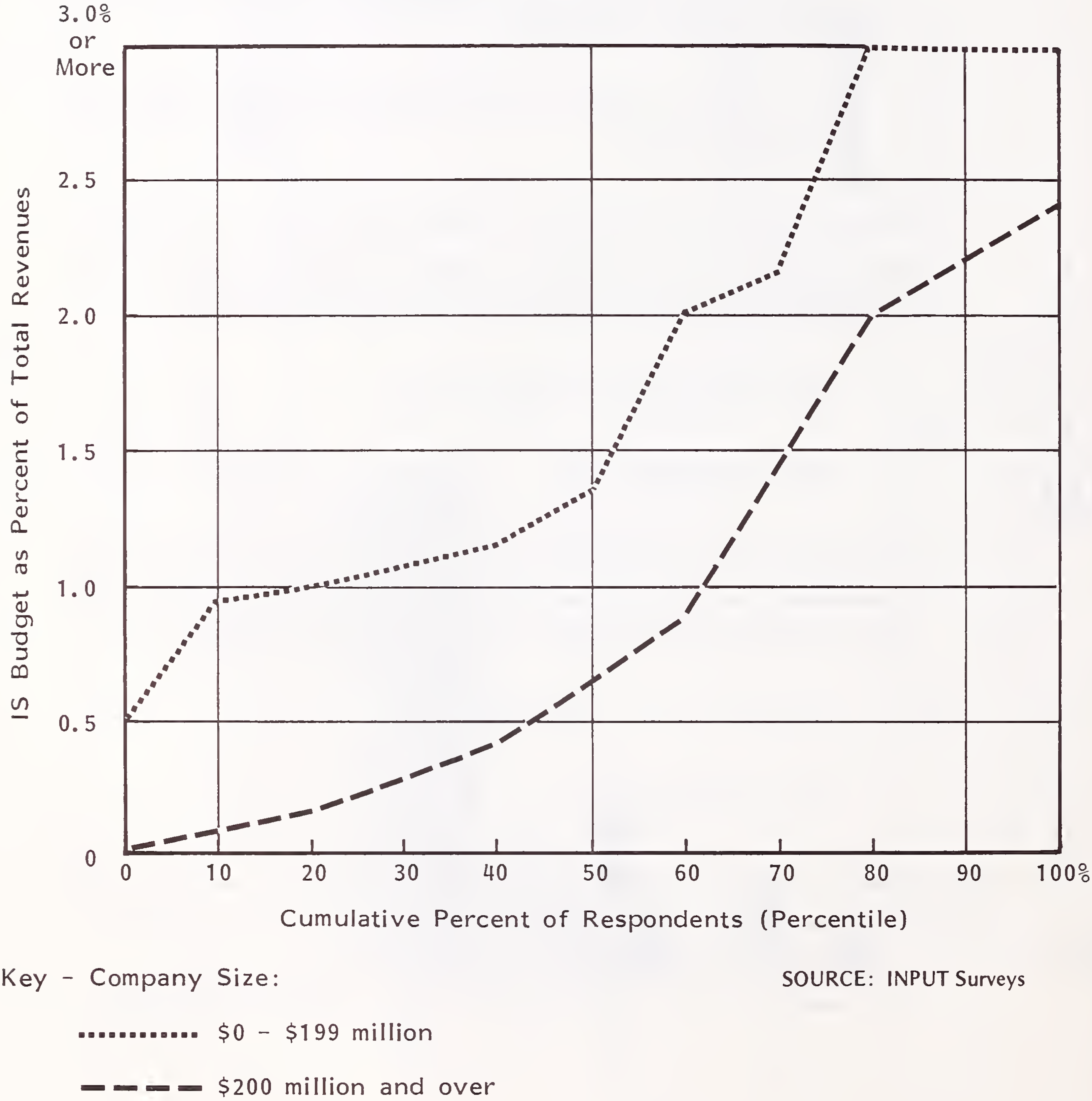


SOURCE: INPUT Surveys

- Exhibit III-152 shows the range of the ratios between the IS budget and the company's total revenues which exists in the services sector.
    - The IS percentage of total revenues for the average company (i.e., at the 50th percentile) in each size group was:
        - For large and medium companies: 0.6%, compared to 0.7% for this size company generally.
        - For small companies: 1.3%, compared to 1.2% for this size company generally.
    - The companies that spend least on data processing as a percentage of revenues are those at and below the 20th percentile. Taking the 10th percentile as representative, the IS spending percentages were:
        - Large and medium companies: 0.1%.
        - Small companies: 1.0%.
    - The companies that spend the most on data processing as a percentage of revenues are those at and above the 80th percentile. Taking the 90th percentile as representative, their IS spending percentages were:
        - Large and medium companies: 2.2%.
        - Small companies: 3.0%.
- Median spending on IS per corporate employee was $950. However, there was a broad range of spending ratios, as shown in the diagram in Exhibit III-153.
    - The reasons for this variation were discussed in Chapter II, Section B.

EXHIBIT III-152

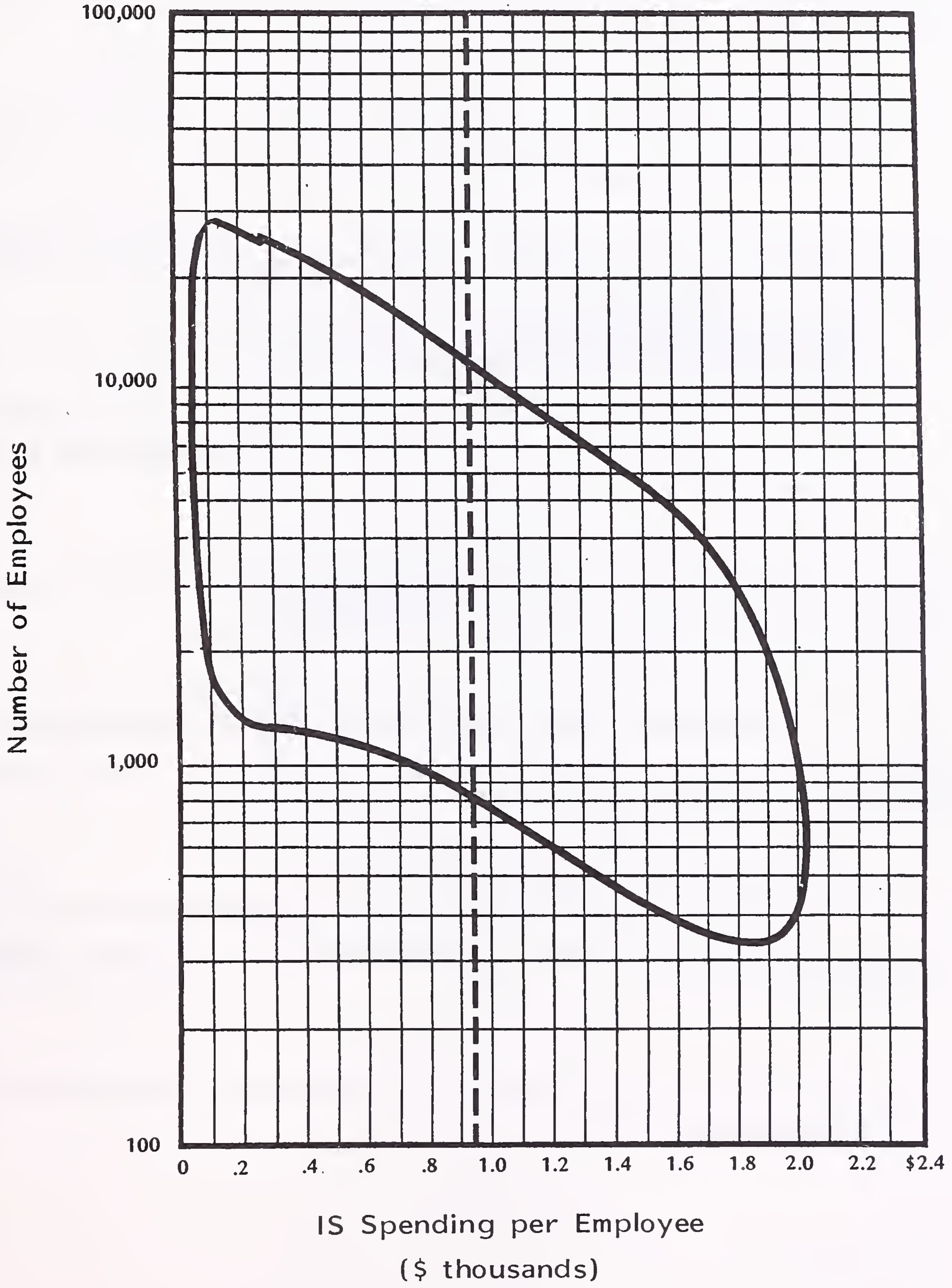
INFORMATION SYSTEMS BUDGET AS A PERCENT OF TOTAL REVENUES IN THE SERVICES SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-153

INFORMATION SYSTEMS SPENDING PER EMPLOYEE BY COMPANY SIZE IN THE SERVICES SECTOR



- - - - = Median

SOURCE: INPUT Surveys

2. STAFFING

- In the staffing sector, 78% of companies expect their IS staffs to increase in the next 12 months, compared to the industry average of 58%, as shown in Exhibit III-154.

  - The net increase in numbers of staff is expected to be 5%, compared to the all-industry average of 4%.

- Turnover in this sector is expected to be less than the all-industry average in 1983, as shown in Exhibit II-9.

  - Current turnover rates for individual positions are shown in Exhibit III-155. For technical positions the turnover rate is close to the average for other sectors.

- Difficulty in recruiting staff in this sector is the same as it is for companies generally, as shown in Exhibit III-156.

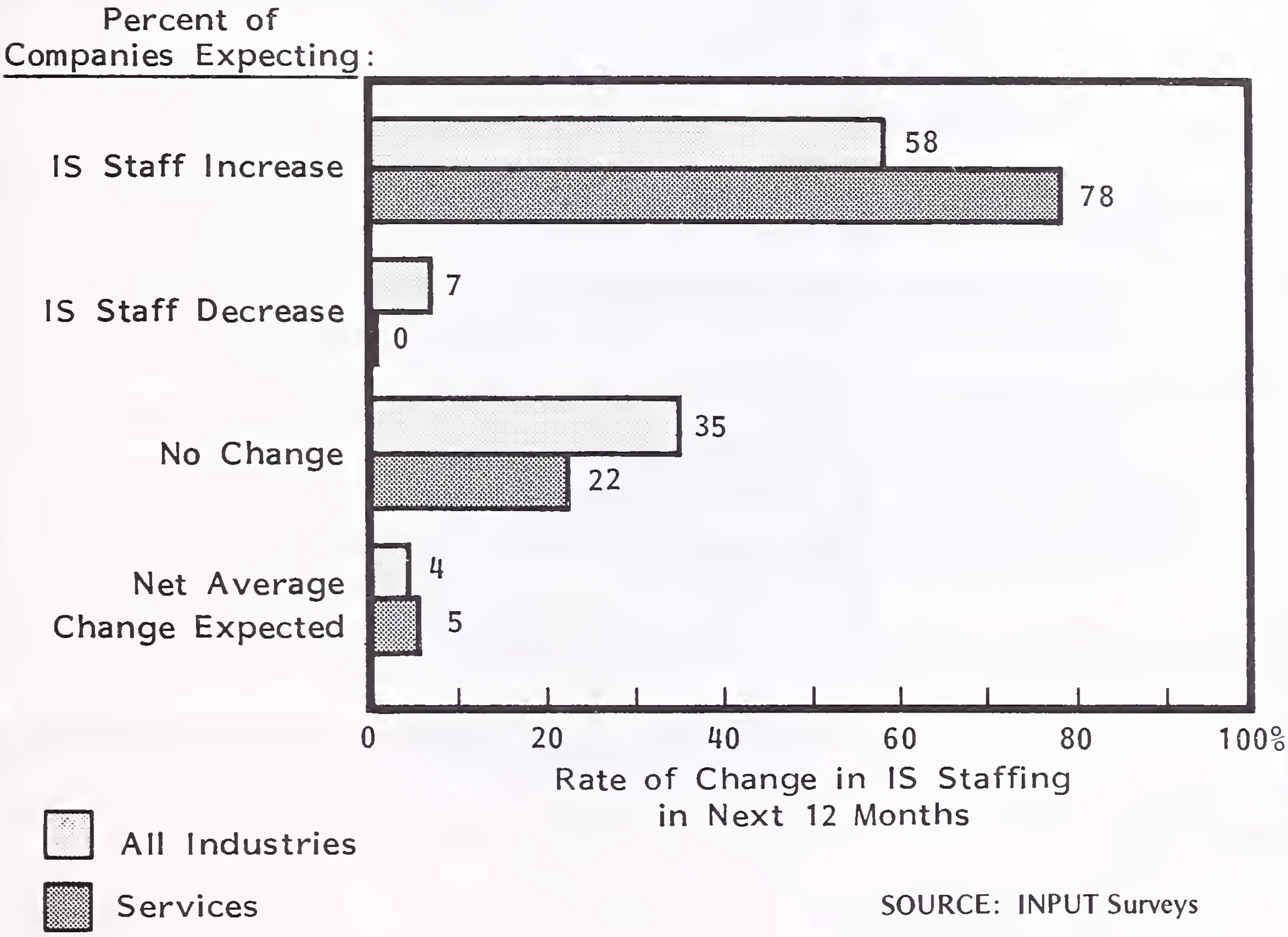
- The number of programs to be maintained averages 950 in this sector, although the range, both in absolute numbers and based on company size, is quite broad, as shown in Exhibit III-157.

  - Maintenance, as a proportion of total workload, is less than it is in most industries and appears to be declining slightly, as shown in Exhibit III-158.

  - Large services companies expect that maintenance will be declining, as shown in Exhibit III-159.

EXHIBIT III-154

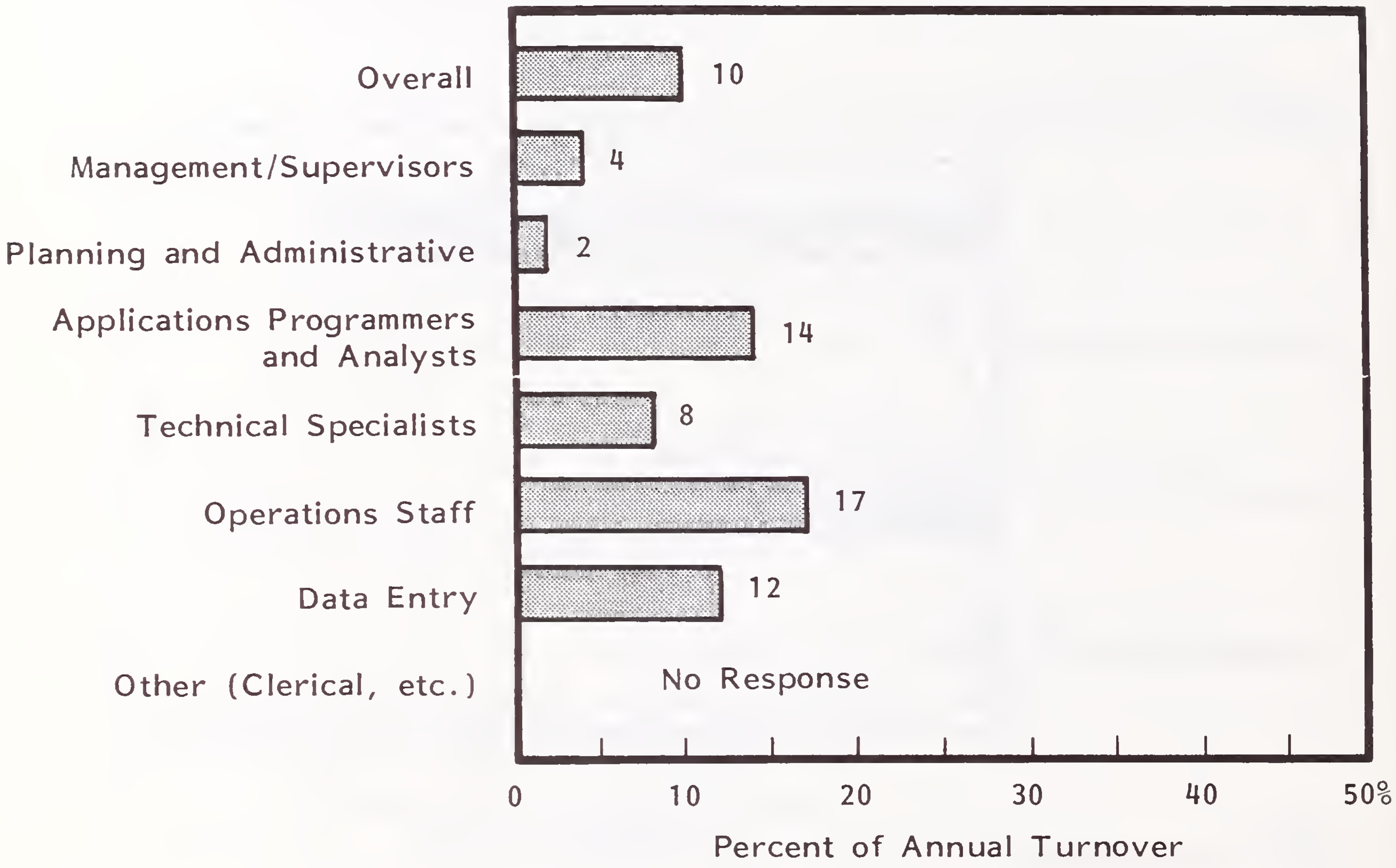
INFORMATION SYSTEMS STAFFING CHANGES EXPECTED IN THE NEXT TWELVE MONTHS IN THE SERVICES SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-155

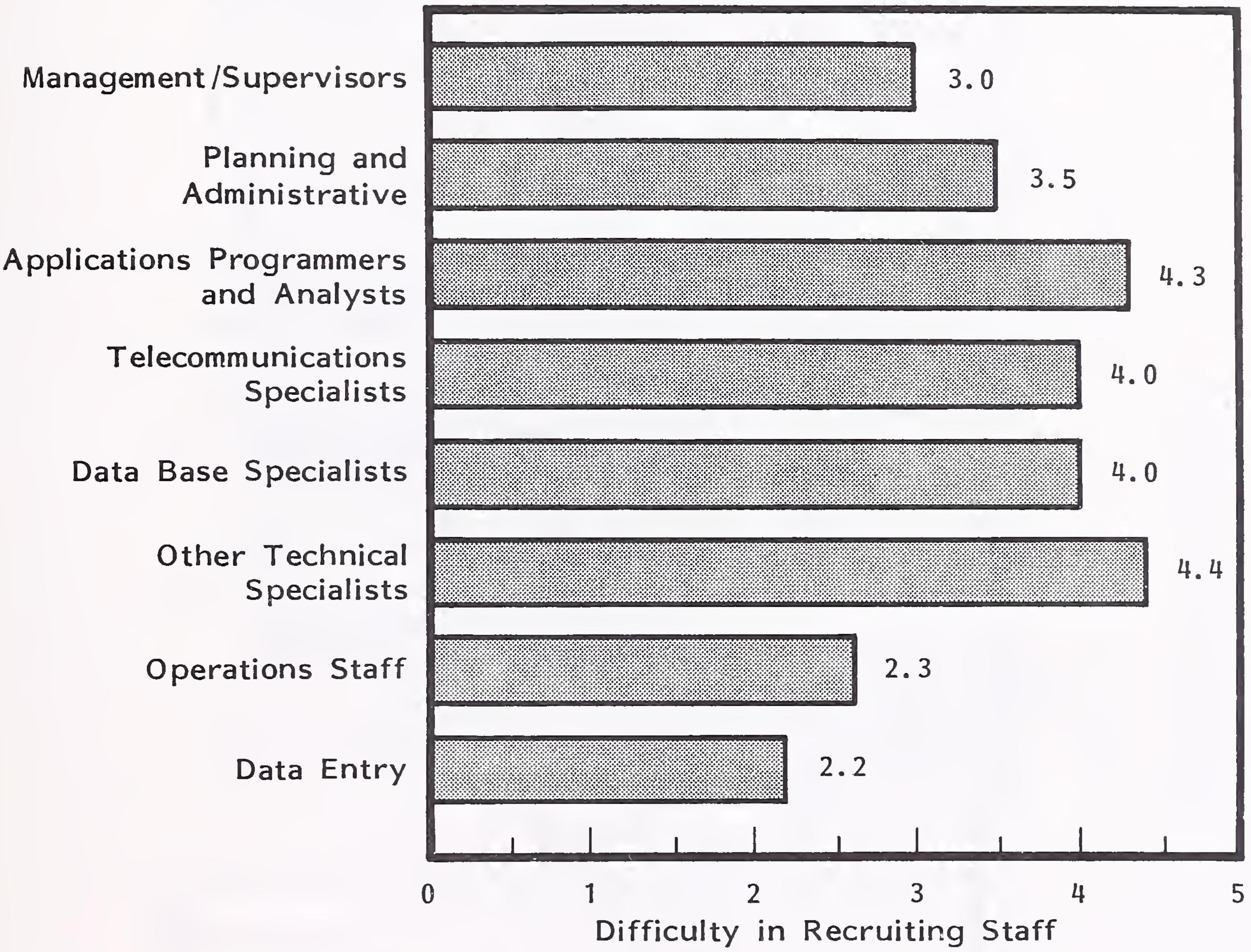
CURRENT ANNUAL TURNOVER IN THE SERVICES SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-156

INFORMATION SYSTEMS DIFFICULTY IN RECRUITING STAFF IN THE SERVICES SECTOR

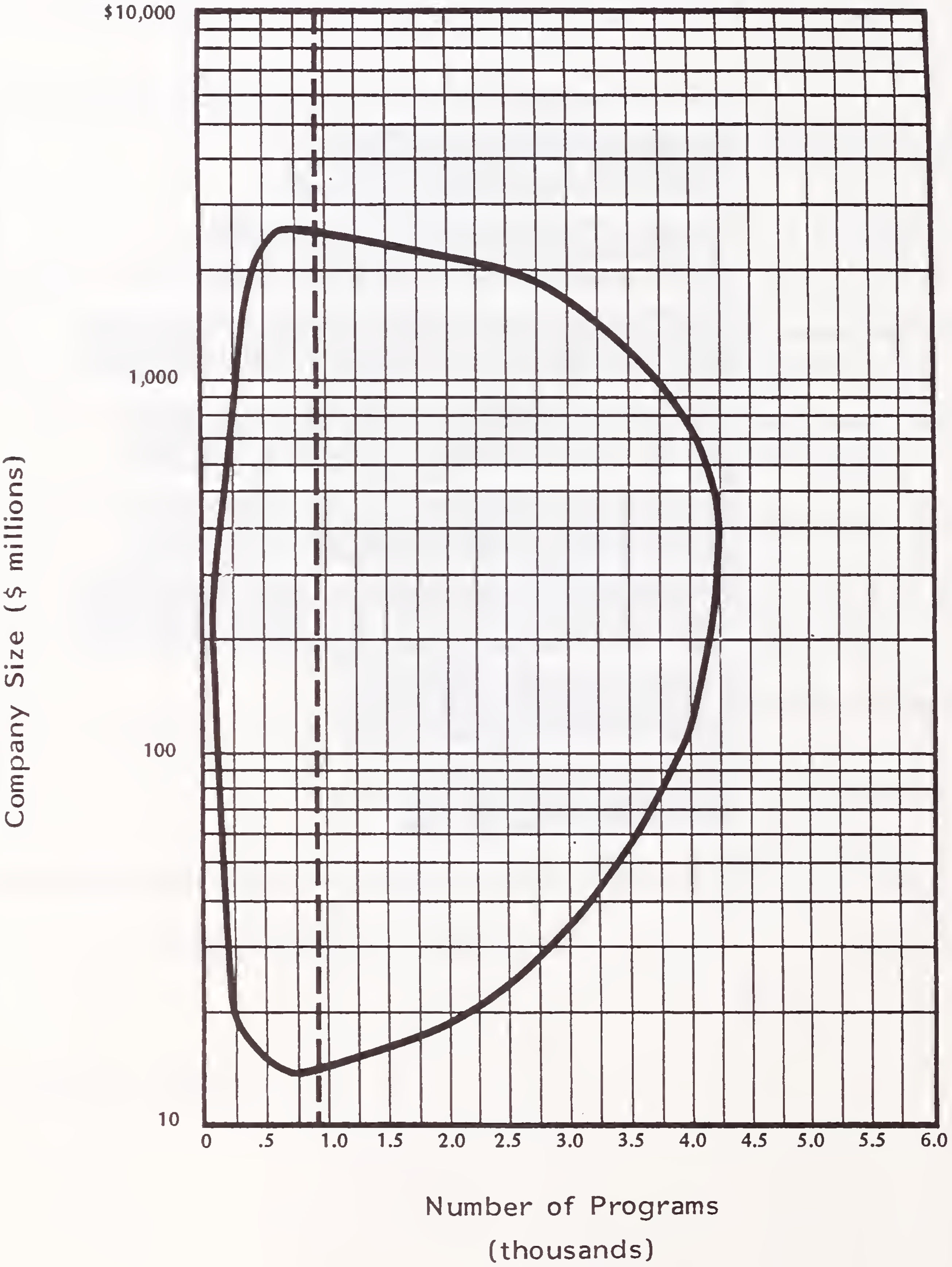


Scale: 1 = Low, 5 = High

SOURCE: INPUT Surveys

EXHIBIT III-157

NUMBER OF PROGRAMS BY COMPANY SIZE IN THE SERVICES SECTOR

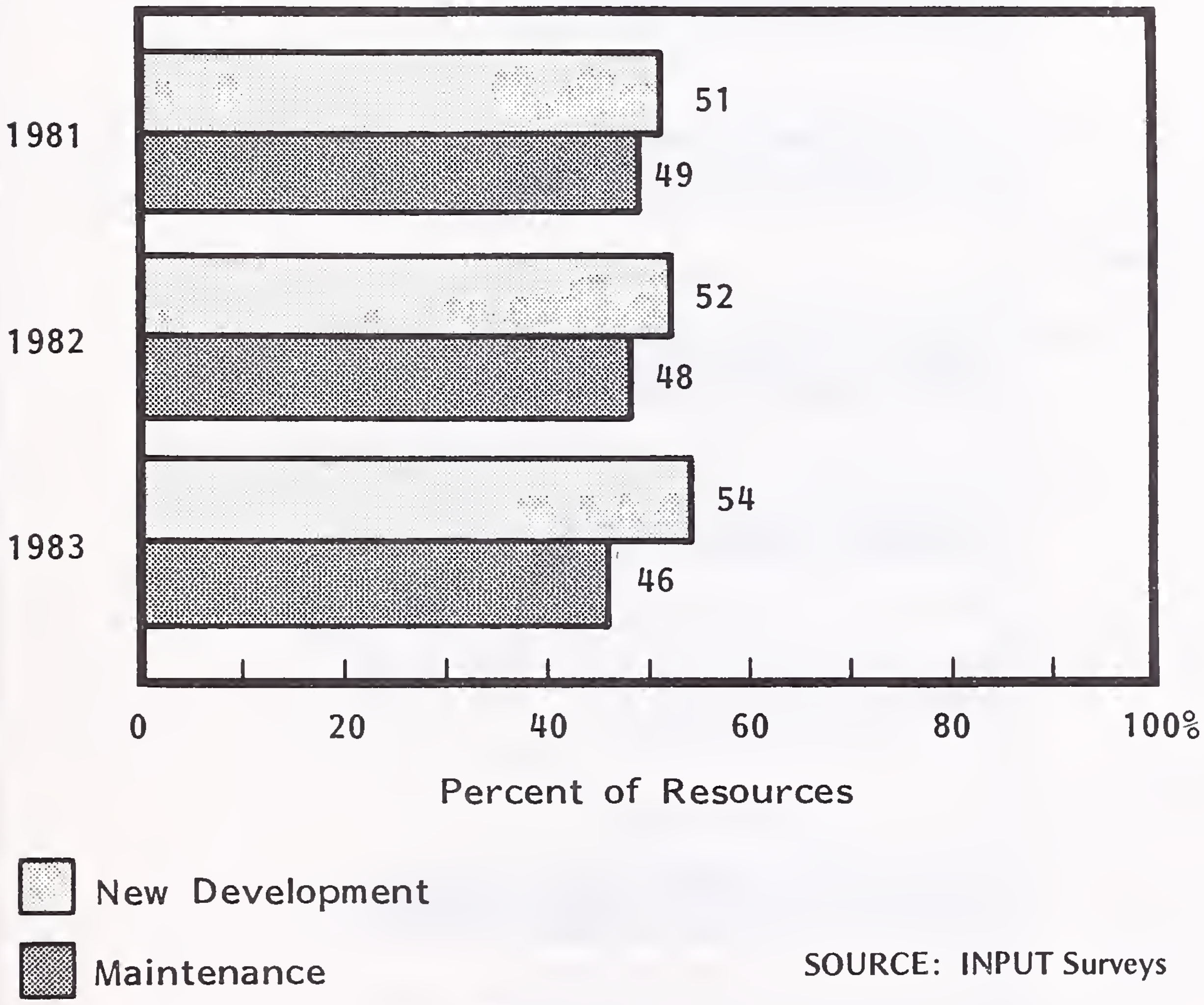


- - - - = Median

SOURCE: INPUT Surveys

EXHIBIT III-158

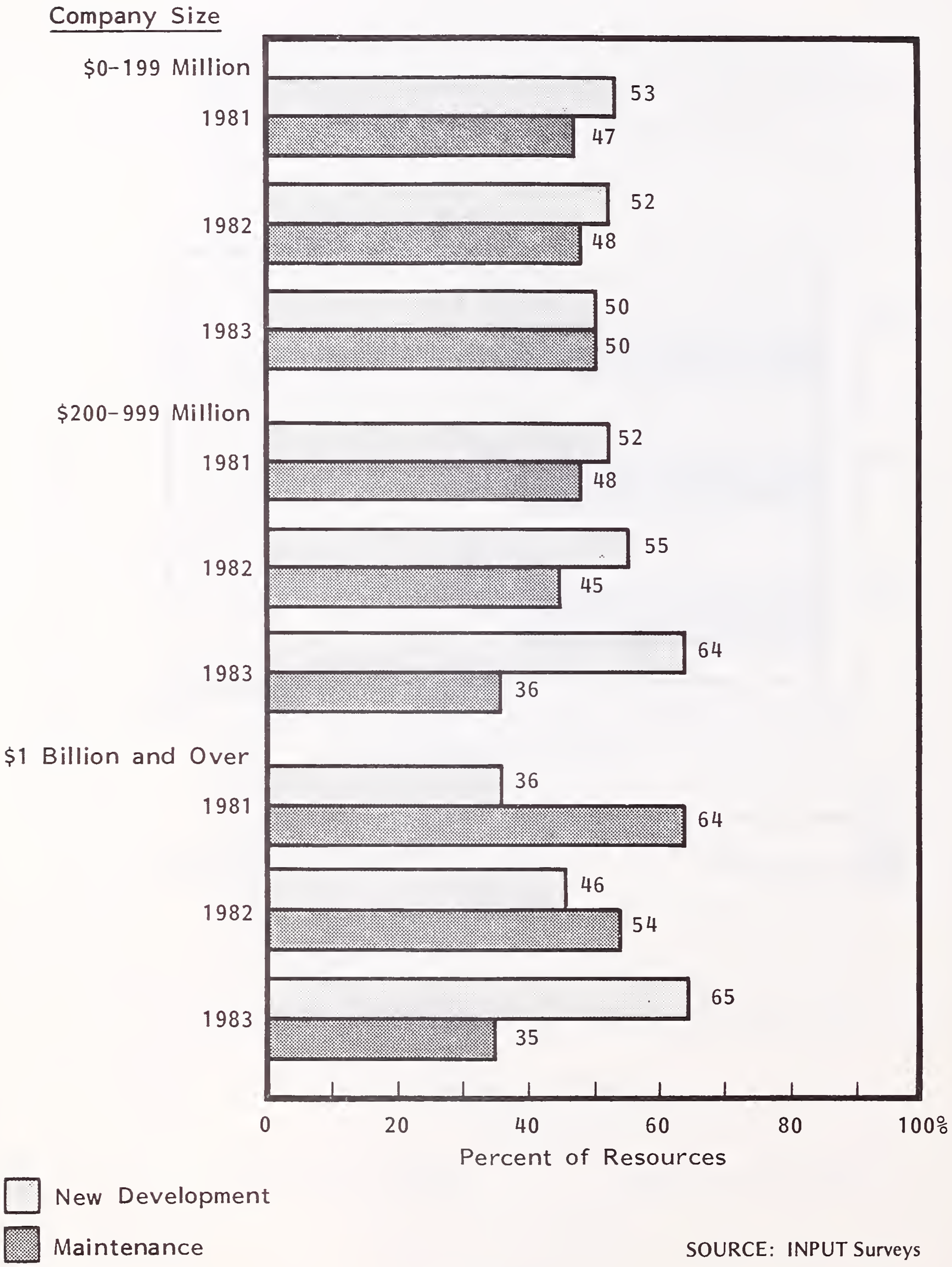
NEW PROGRAM DEVELOPMENT VERSUS MAINTENANCE IN THE SERVICES SECTOR, 1981-1983



SOURCE: INPUT Surveys

EXHIBIT III-159

NEW PROGRAM DEVELOPMENT VERSUS MAINTENANCE IN THE SERVICES SECTOR, 1981-1983



SOURCE: INPUT Surveys

3. INFORMATION SYSTEMS ISSUES

- Note: please refer to Chapter II, Section D for a general discussion of IS problems, objectives, and initiatives and their interrelationships.

- The services industry, in its own view, has fewer problems than most other sectors, as shown Exhibit III-160.

  - More detailed information about specific problem areas is contained in Exhibit III-161. This exhibit shows the percentage of companies in this sector which regard an issue as a major problem.

- Similarly, the services industry's objectives follow the same pattern as the all-industry average but with less intensity, as shown in Exhibit III-162.

  - More detailed inforamtion about specific planning objectives is contained in Exhibit III-163. This exhibit shows the percentage of companies in this sector which have identified particular planning objectives as being of major importance to them.

- This sector plans relatively few software and planning and control initiatives, compared to most other industries, as shown in Exhibit III-164. Otherwise, its initiatives are near the all-industry average.

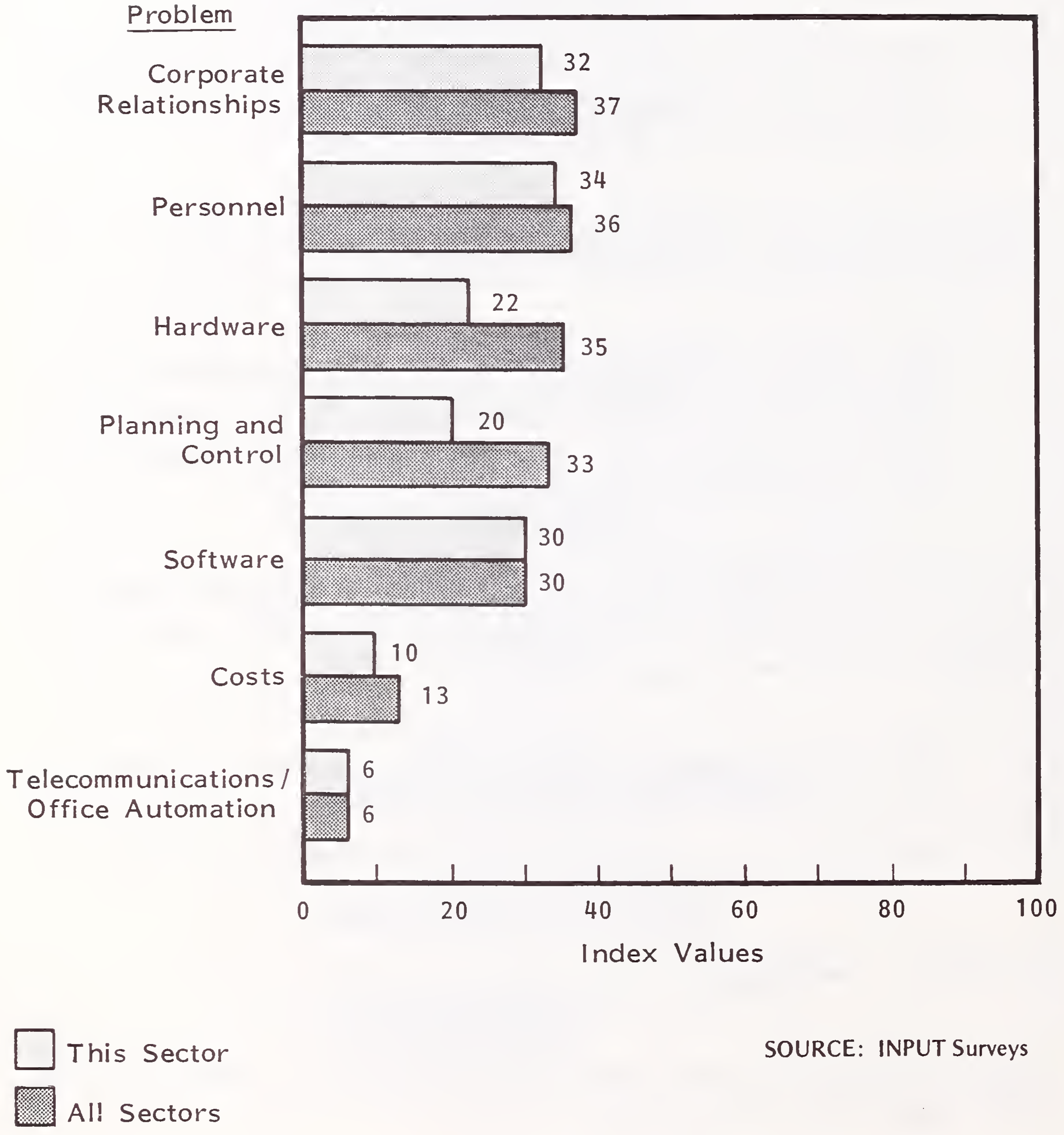
  - More detailed information about specific areas where an initiative is planned is contained in Exhibit III-165. This exhibit shows the percentage of companies in this sector which plan a major initiative in a particular area.

4. PERSONAL COMPUTERS

- Plans for the use of personal computers in this sector are shown in Exhibit III-166 and involve:

EXHIBIT III-160

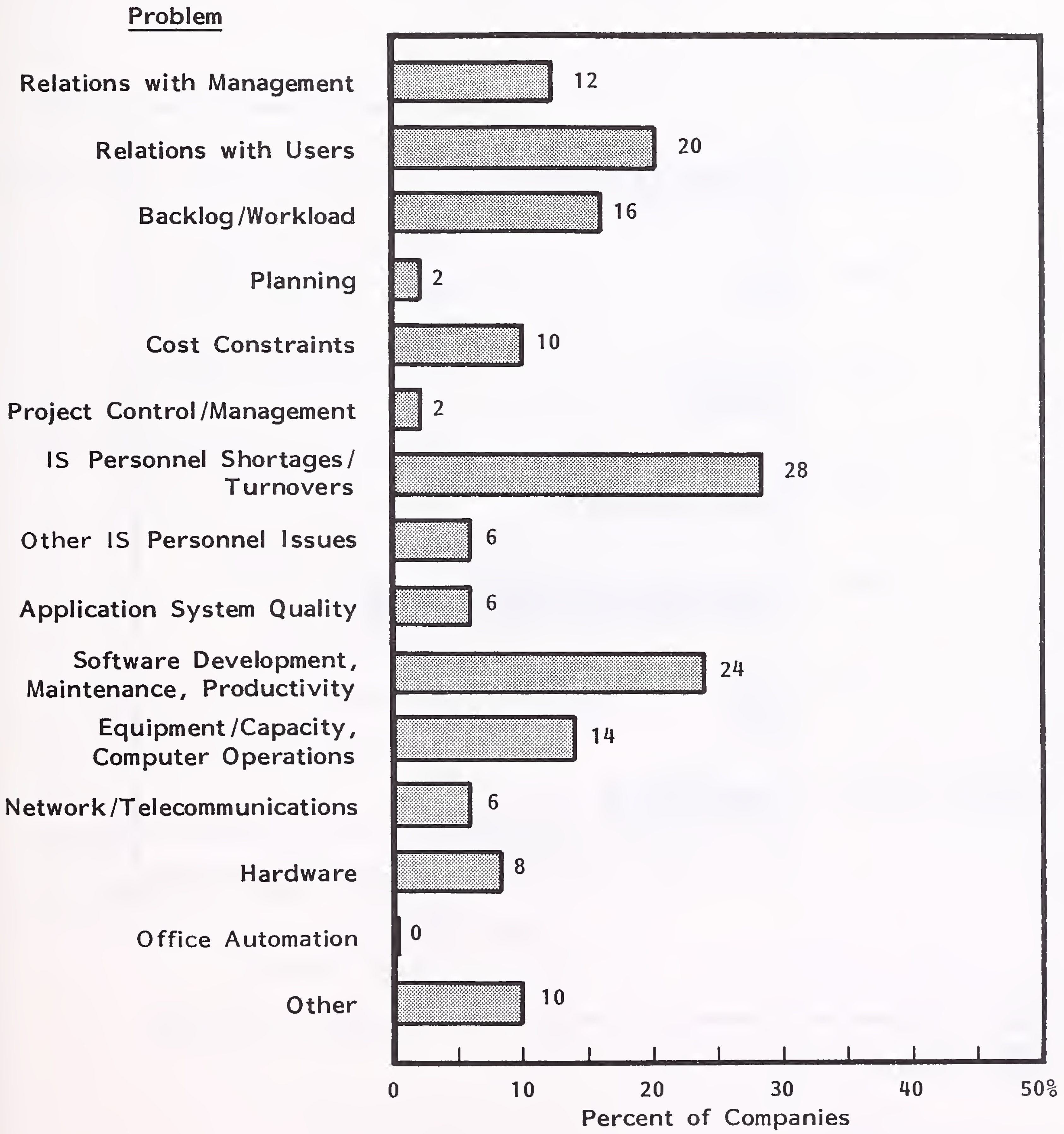
INFORMATION SYSTEMS PROBLEMS IN THE SERVICES SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-161

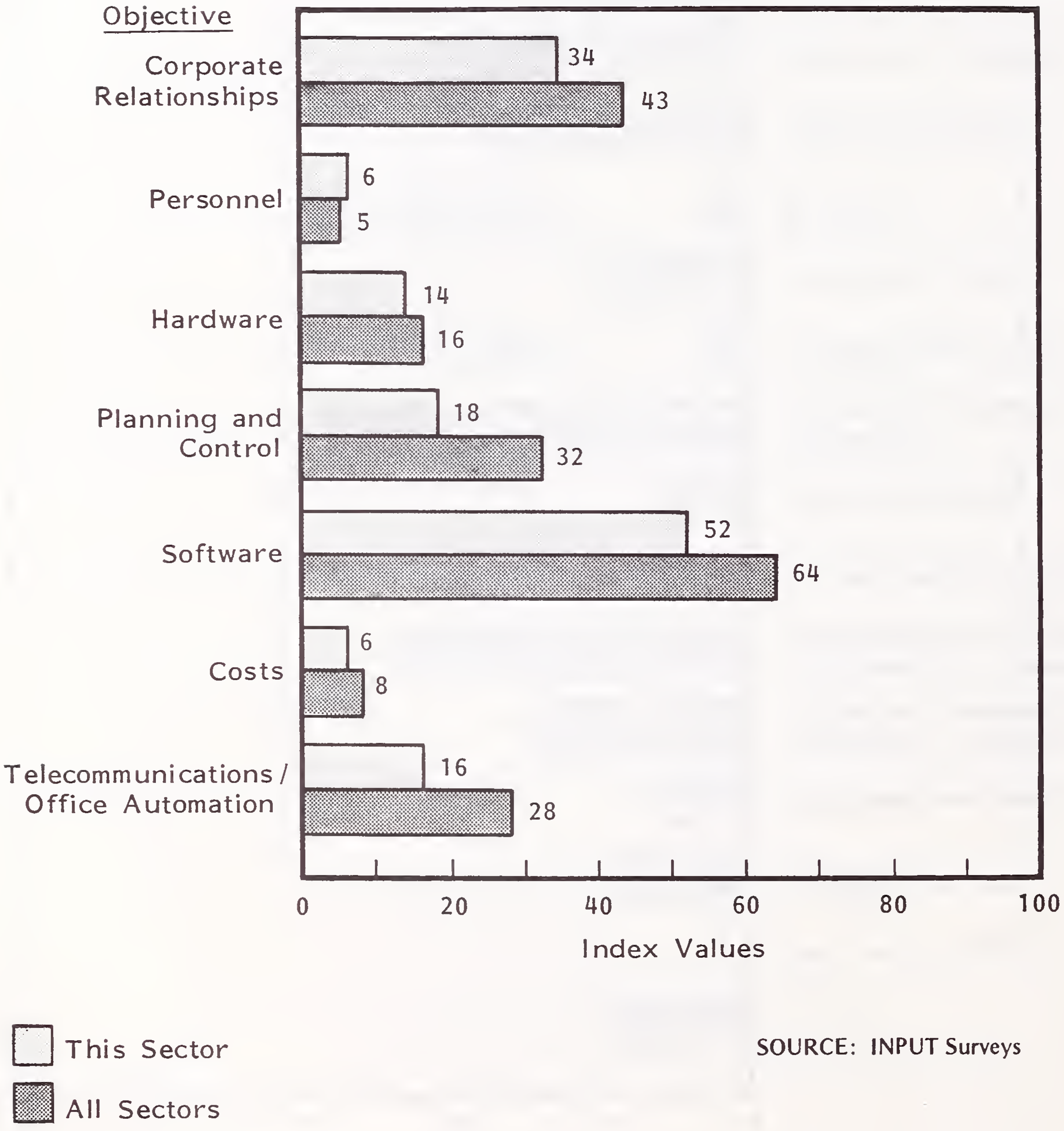
INFORMATION SYSTEMS PROBLEMS IN THE SERVICES SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-162

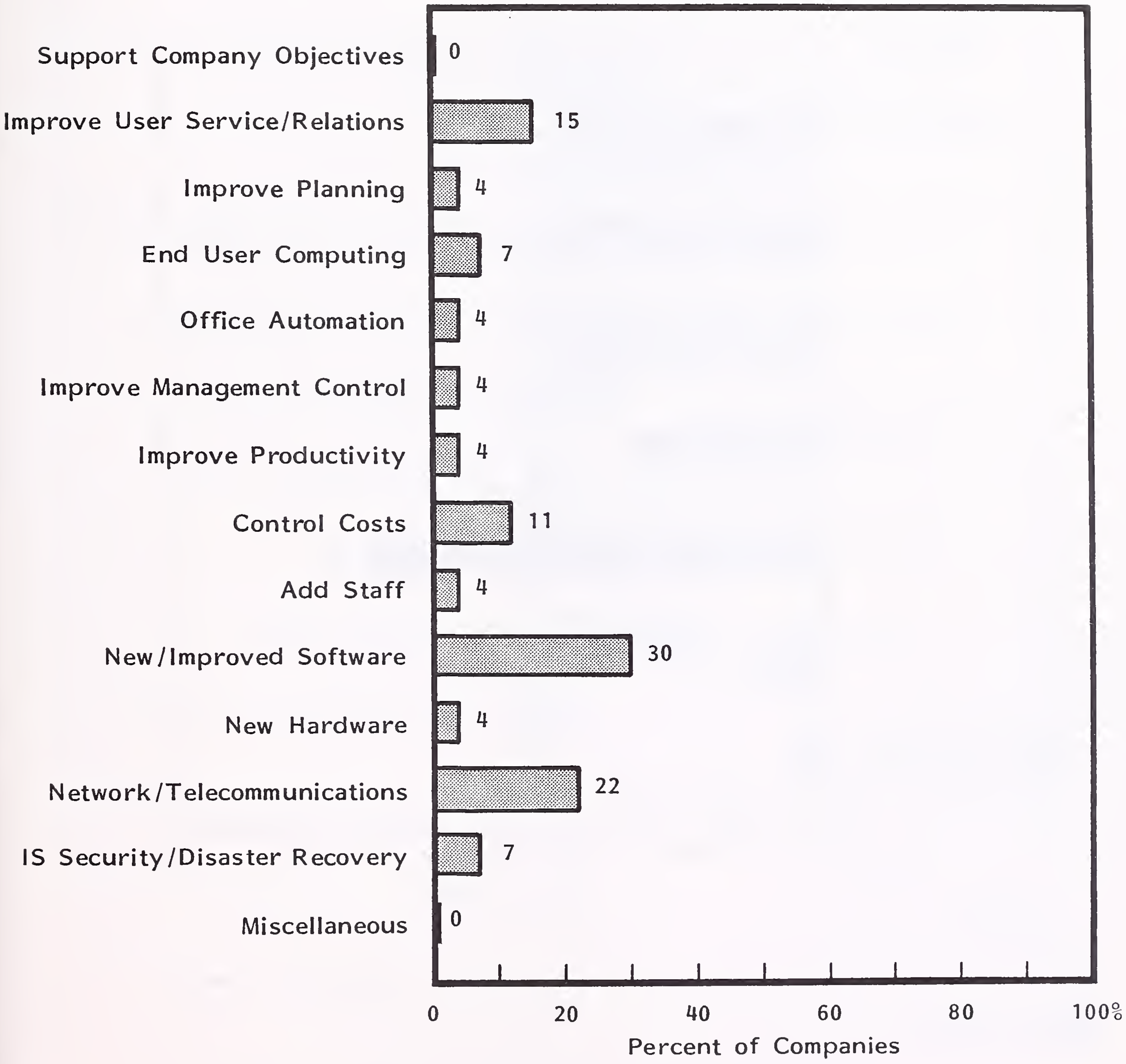
INFORMATION SYSTEMS OBJECTIVES IN THE SERVICES SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-163

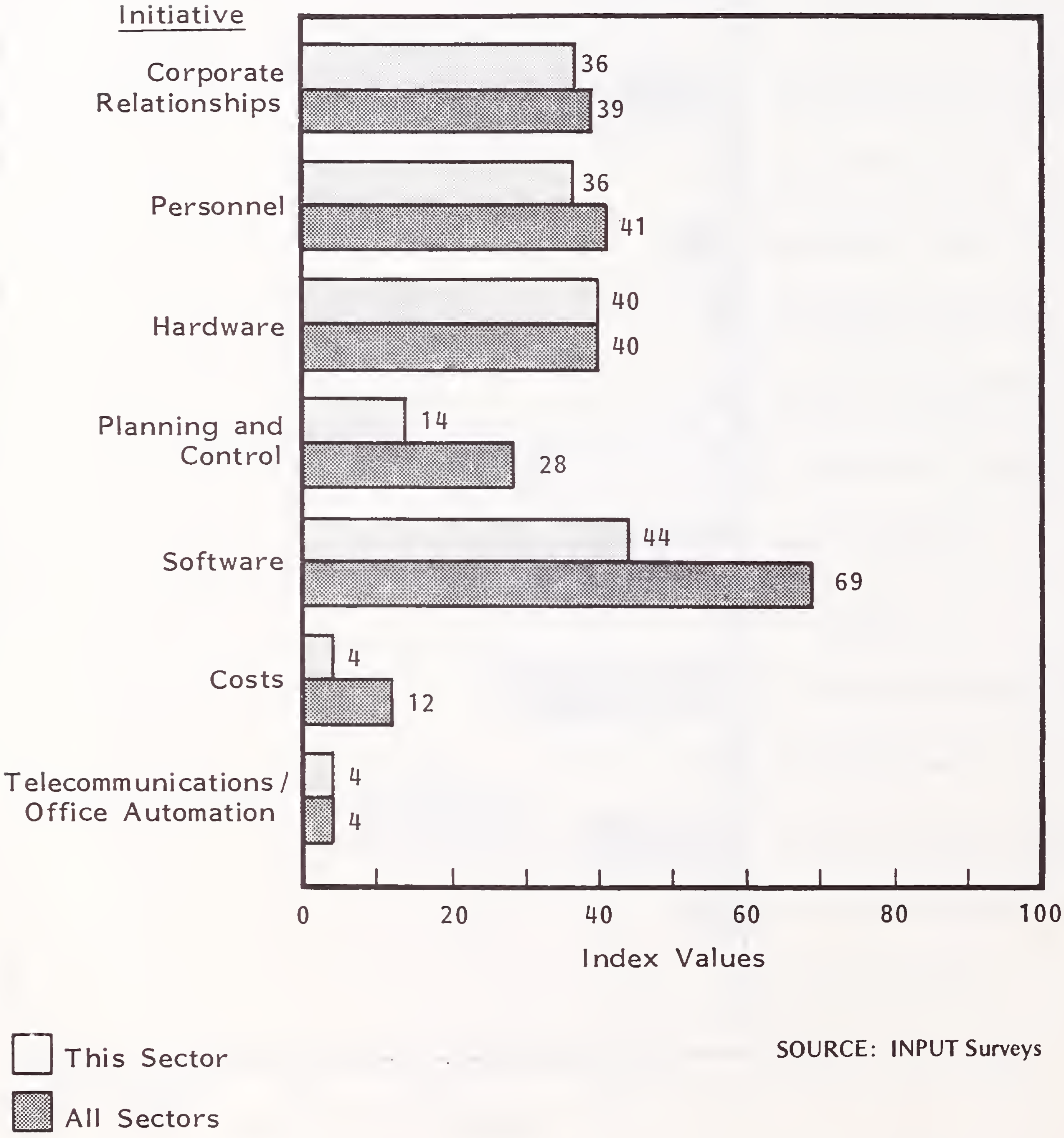
INFORMATION SYSTEMS OBJECTIVES IN THE SERVICES SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-164

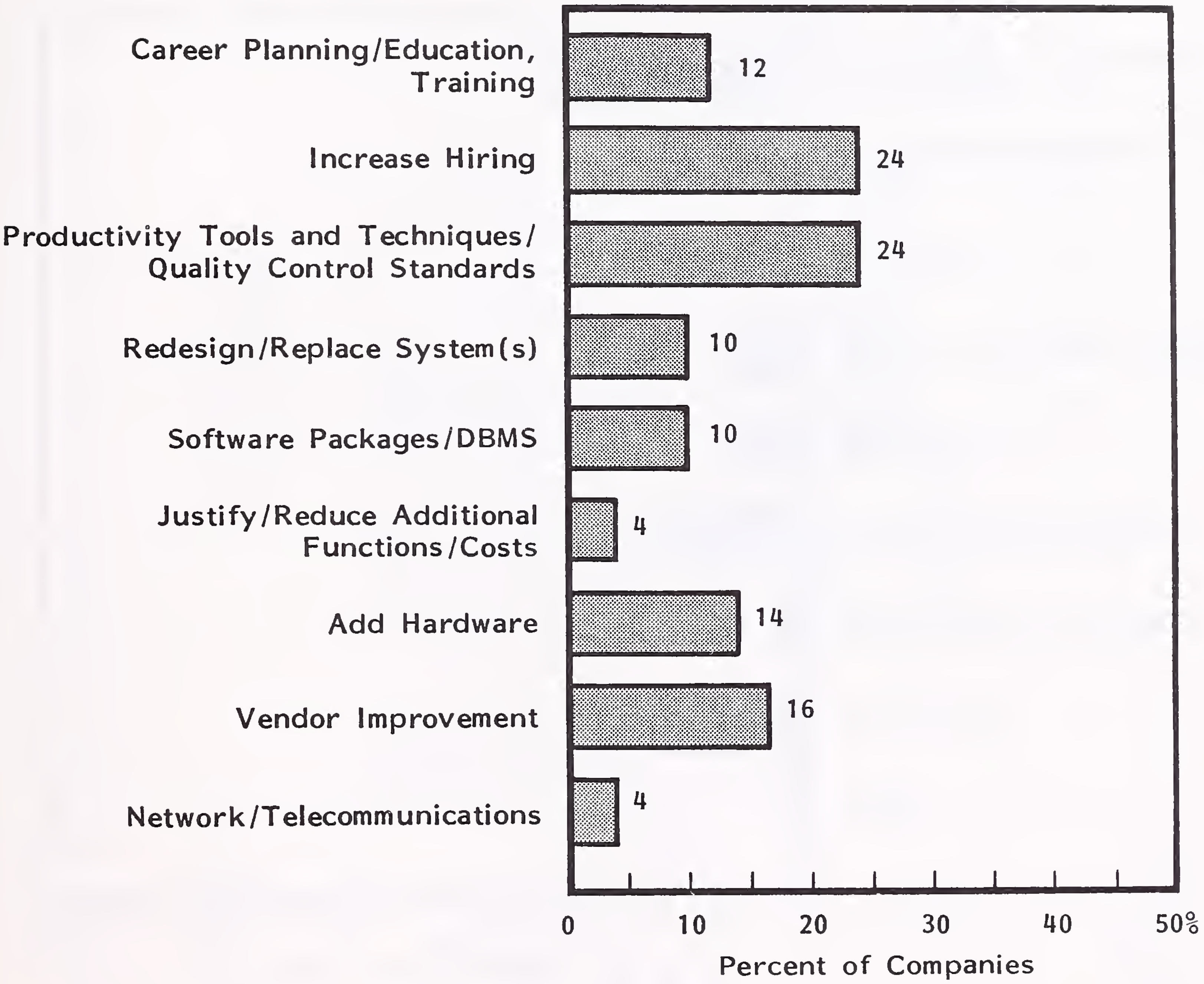
INFORMATION SYSTEMS INITIATIVES IN THE SERVICES SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-165

INFORMATION SYSTEMS INITIATIVES PLANNED IN THE SERVICES SECTOR

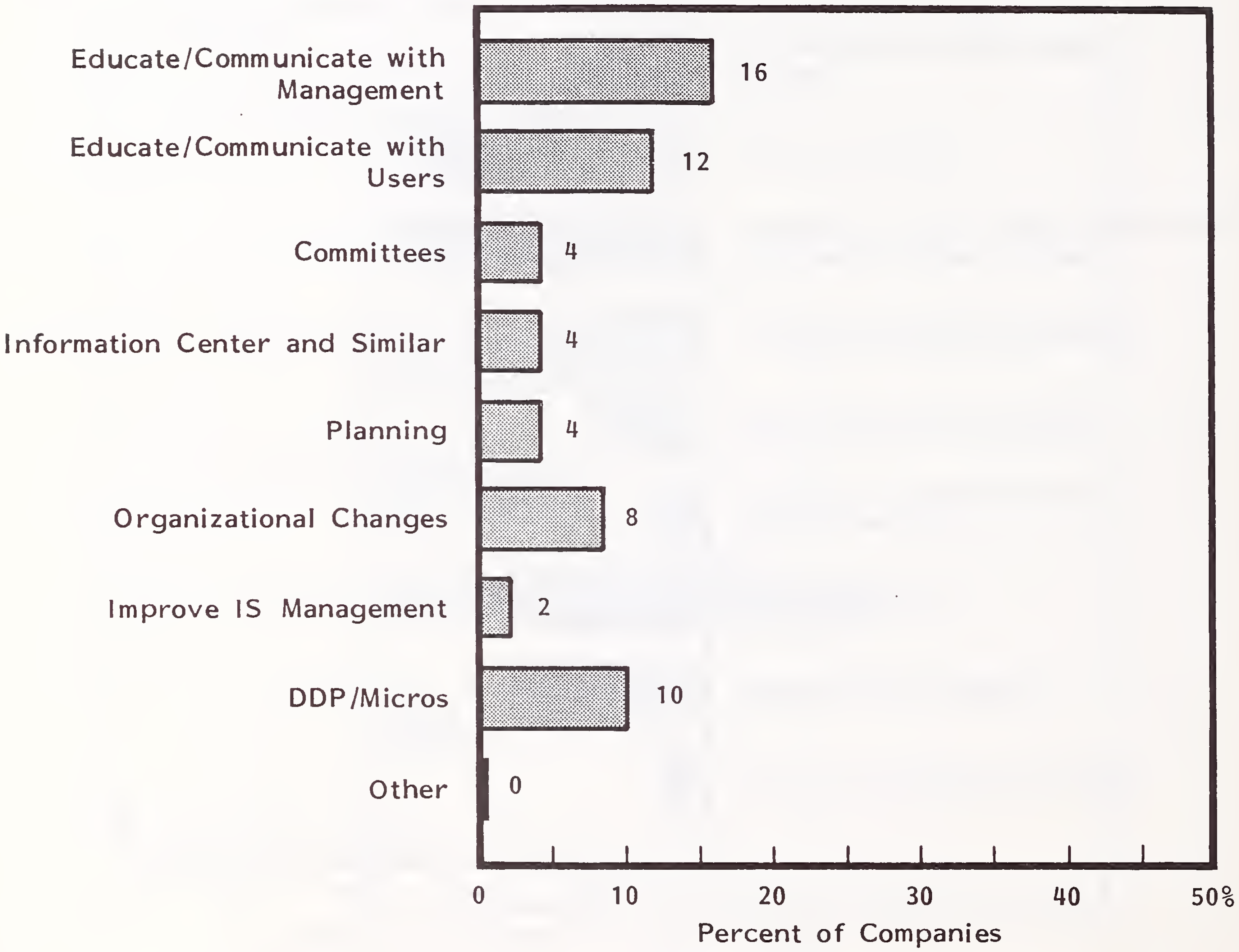


Continued

SOURCE: INPUT Surveys

EXHIBIT III-165 (Cont.)

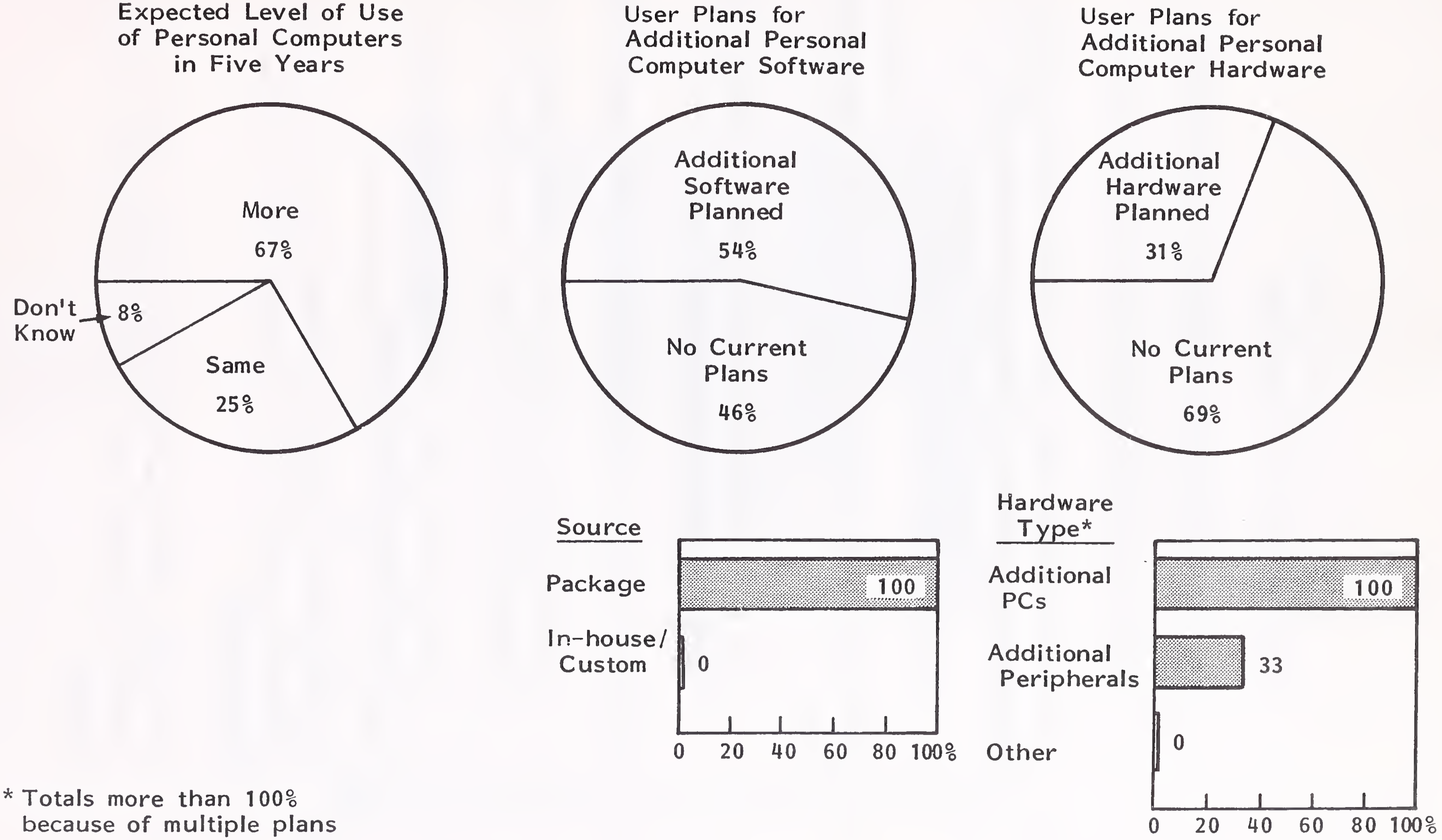
INFORMATION SYSTEMS INITIATIVES PLANNED IN THE SERVICES SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-166

PERSONAL COMPUTER ACQUISITION PLANS IN THE SERVICES SECTOR



* Totals more than 100% because of multiple plans

SOURCE: INPUT Surveys

  - The overall level of use in five years.

  - Plans for obtaining additional personal computer software.

  - Plans for obtaining additional personal computer hardware.

- There are considerably fewer plans to obtain additional personal computer hardware in the services sector than by companies generally.

  - Software package acquisition is planned exclusively.

- Exhibit III-167 shows the types of personal computer software packages now used.

  - The service sector is much more involved with graphics and business planning software than other sectors.

- The general categories of applications used are summarized in Exhibit III-168.

  - Financial applications are the primary personal computer focus. Other application areas have, so far, been virtually ignored.

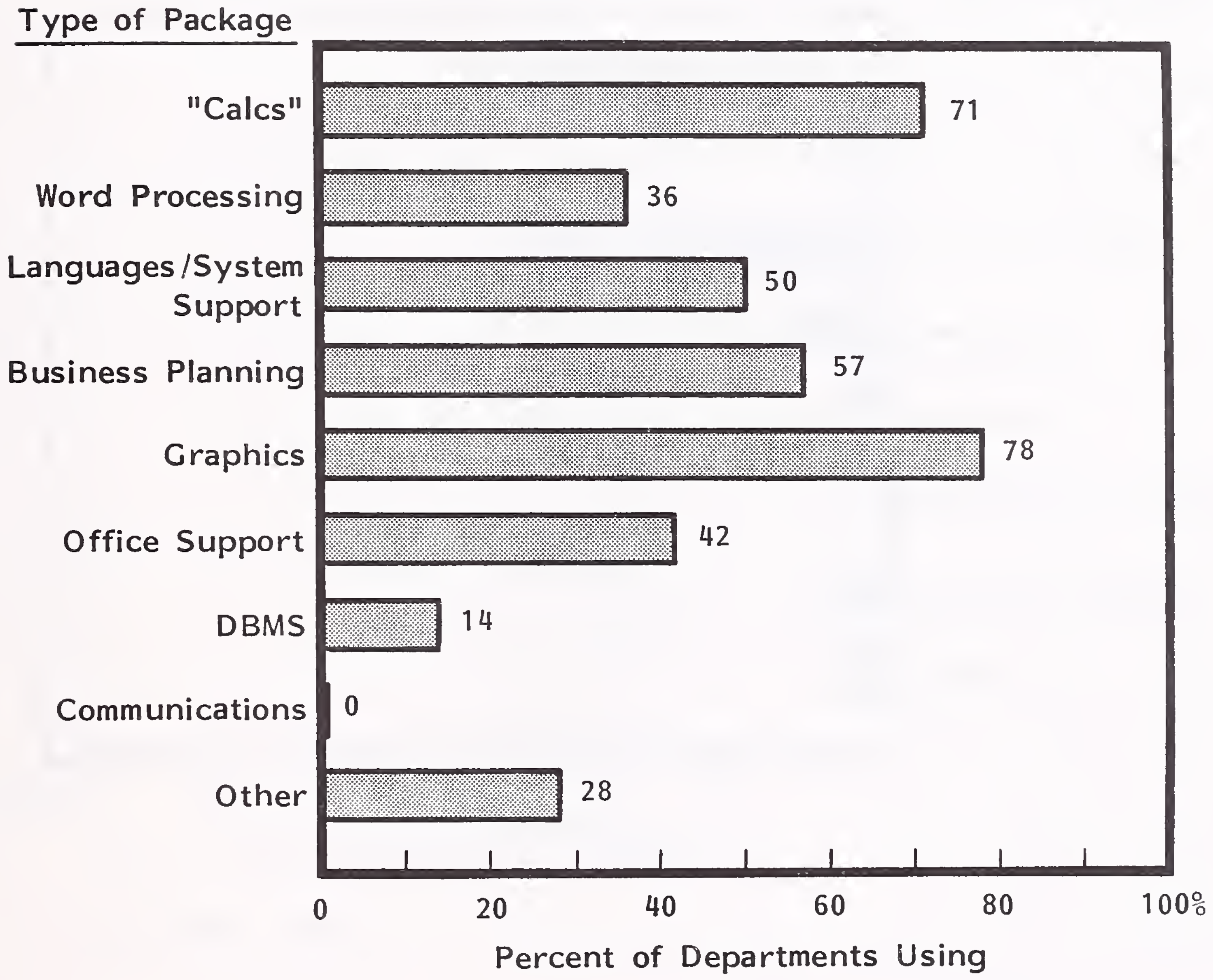
  - Exhibit III-169 provides examples of actual personal computer applications in use in the services sector.

- Compared to the average user, personal computer users in this sector are somewhat more likely to rely on the IS department for assistance, as shown in Exhibit III-170.

- In this sector 72% of departments using personal computers have had their installation less than a year, as shown in Exhibit III-171, compared to 78% generally.

EXHIBIT III-167

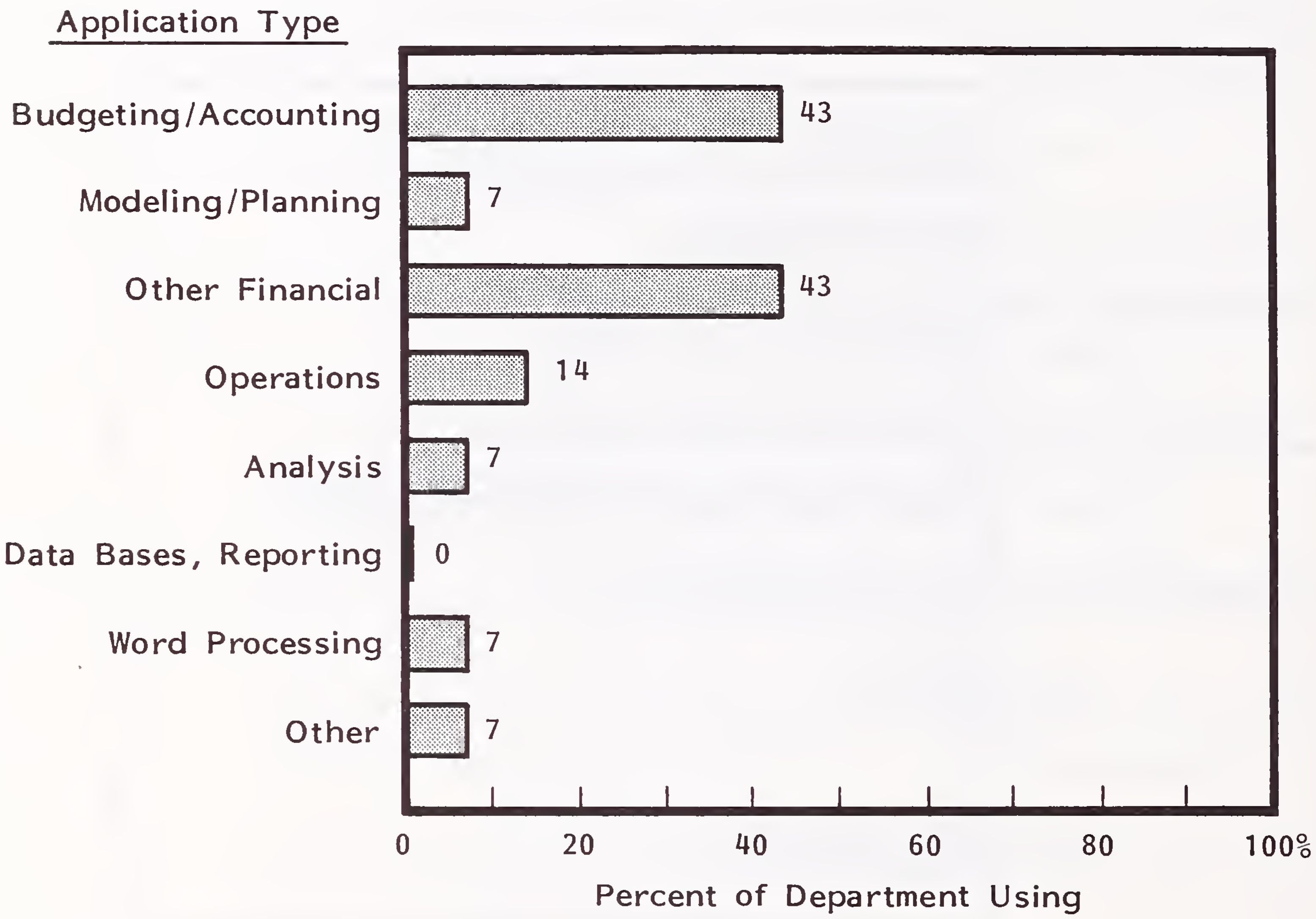
TYPES OF PERSONAL COMPUTER SOFTWARE PACKAGES USED IN THE SERVICES SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-168

PERSONAL COMPUTER APPLICATIONS IN THE SERVICES SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-169

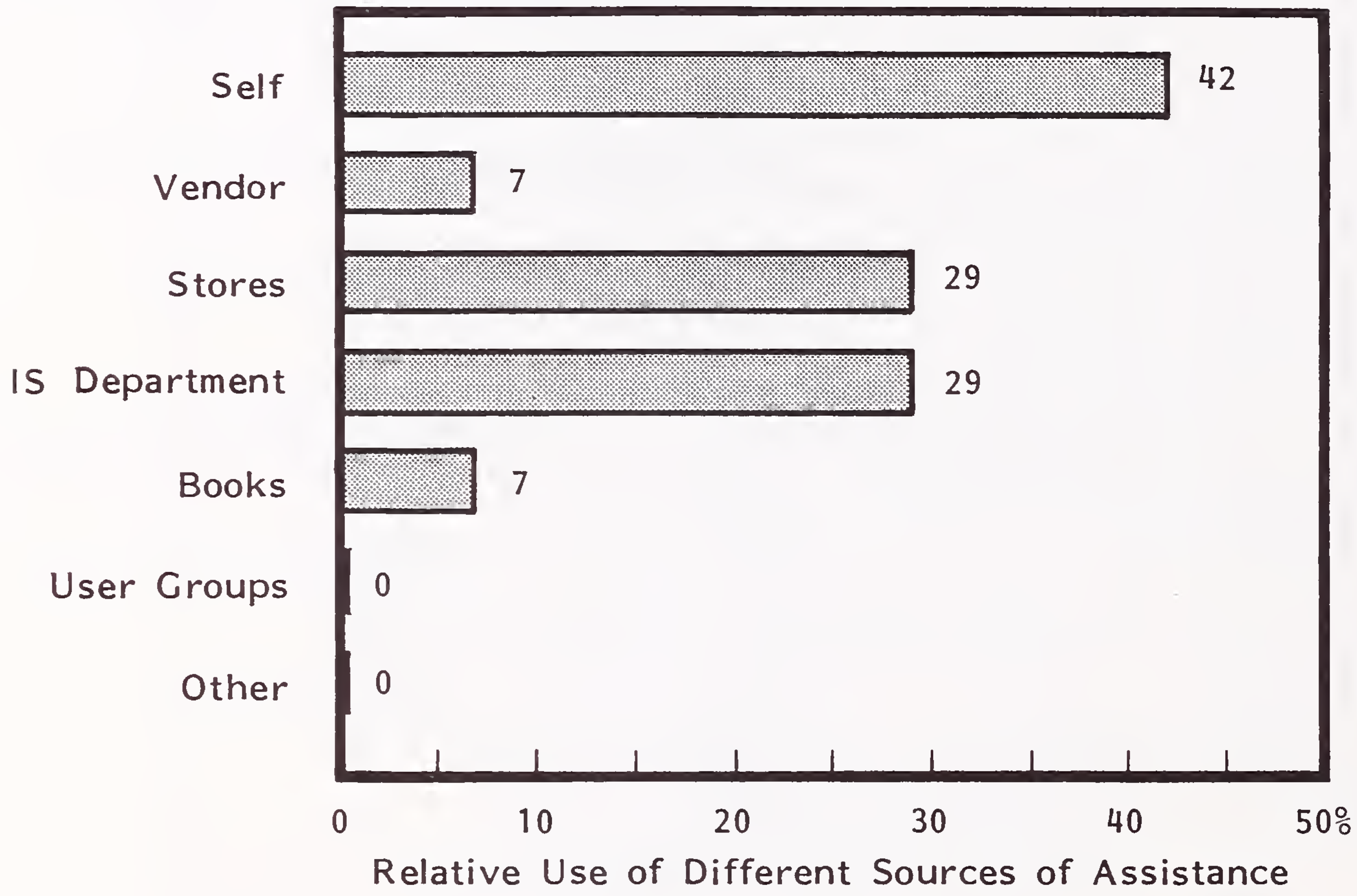
PERSONAL COMPUTER APPLICATIONS IN THE SERVICES SECTOR

Financial Reporting
Financial Modeling
General Accounting
Word Processing
Math Schedule
General Ledger
Cash Flow
Discounts
Accounts Receivable and Accounts Payable
Payroll
Analysis
Statistics Models
Invoices
Inventory
Billing
Processing

SOURCE: INPUT Surveys

EXHIBIT III-170

SOURCES OF ASSISTANCE FOR PERSONAL COMPUTER USERS IN THE SERVICES SECTOR

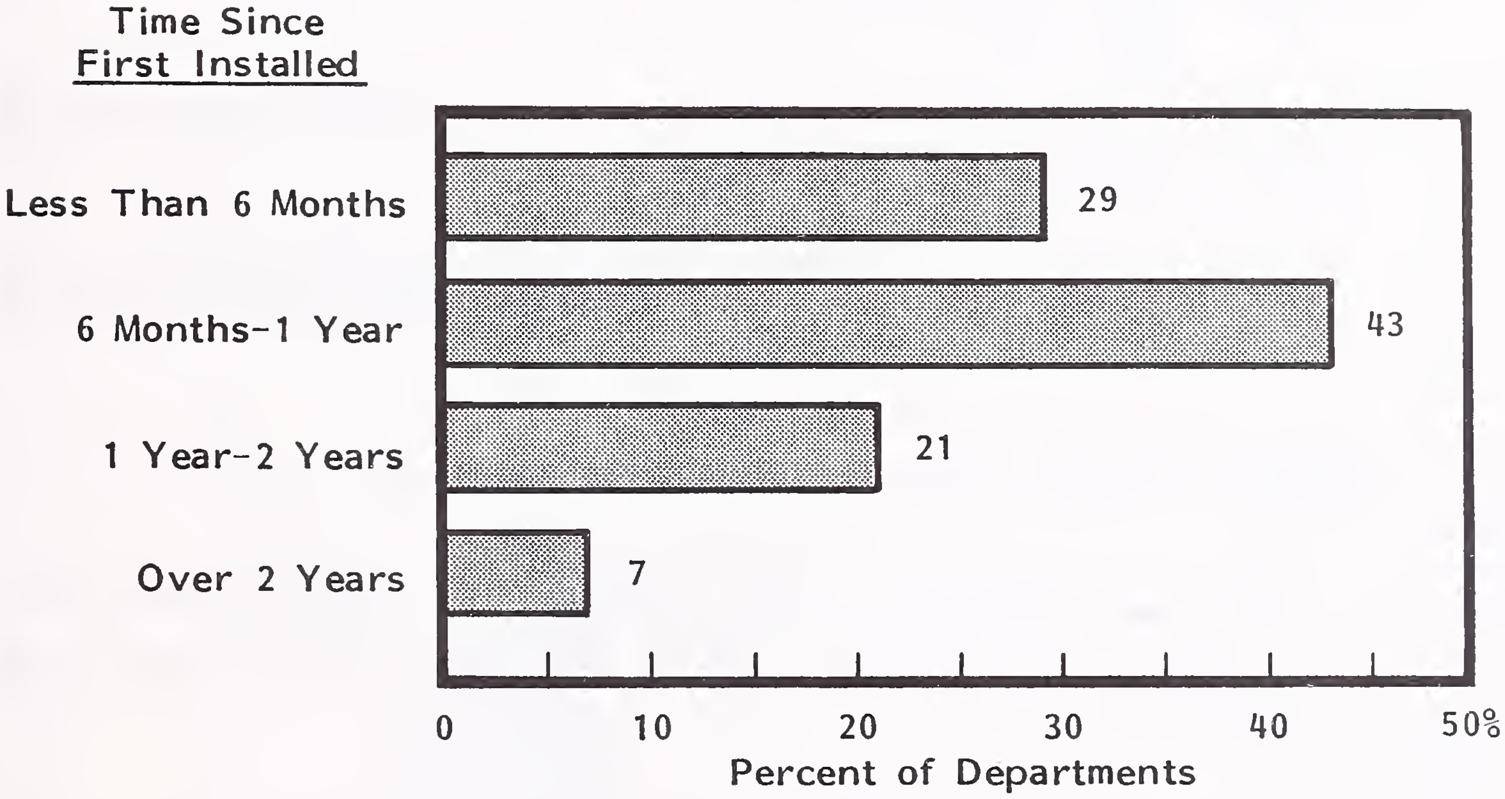


Note: Total Is More Than 100% Because of Multiple Sources.

SOURCE: INPUT Surveys

EXHIBIT III-171

TIME SINCE FIRST PERSONAL COMPUTER INSTALLED IN USER DEPARTMENTS IN THE SERVICES SECTOR



SOURCE: INPUT Surveys

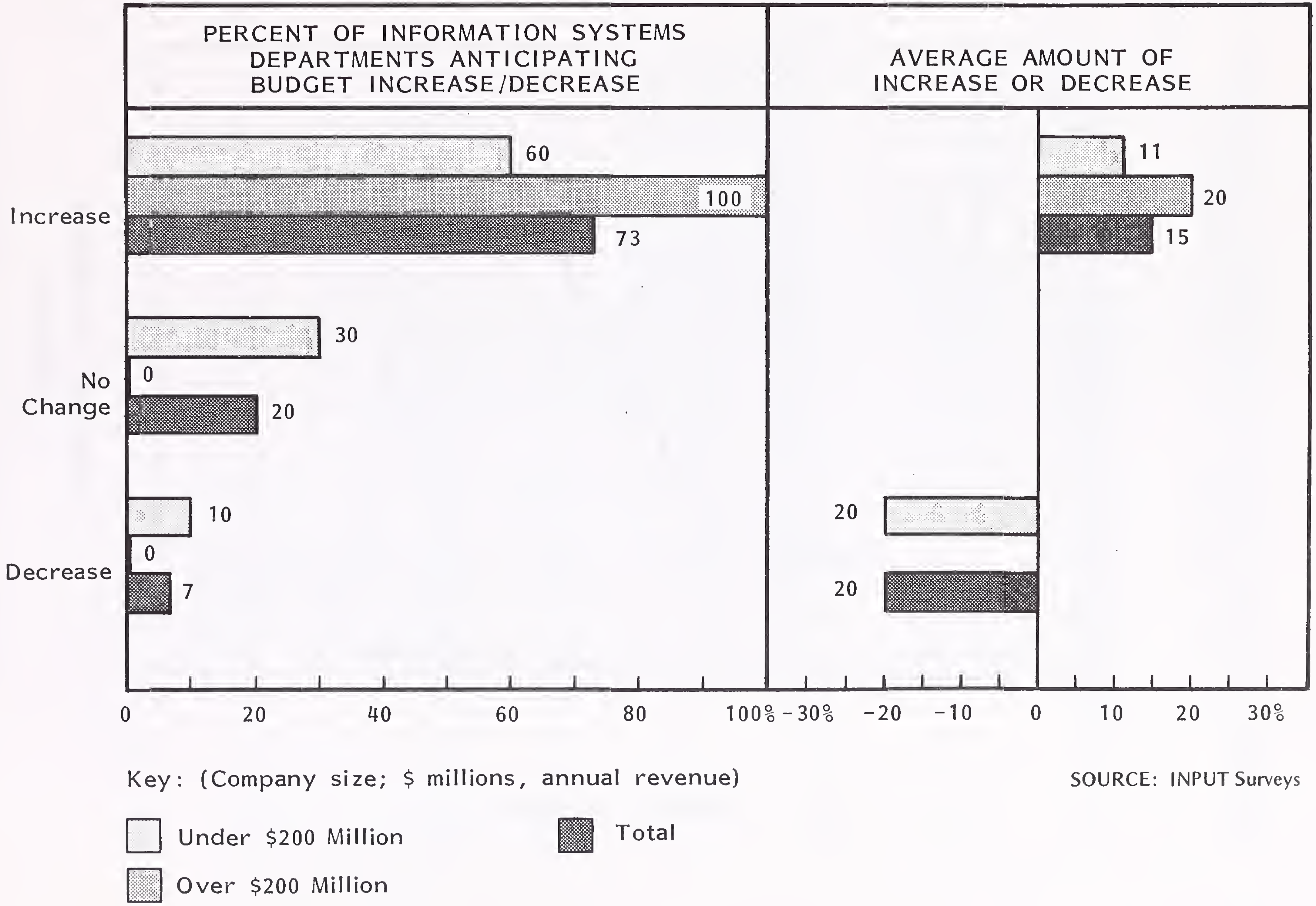
J. GOVERNMENT AND EDUCATION SECTOR

1. BUDGETS

- In this sector 73% of the organizations expect budget increases in 1983, compared to 61% generally. Seven percent expect a decrease compared to 8% generally, as shown in Exhibit III-172.
    - Organizations expecting to increase their budgets foresee an average rise of 15%.
    - Organizations anticipating decreases expect their budgets to drop by 20%.
- The budget increases expected vary by organization size.
    - Large and medium-sized organizations: 100% expect increases in the government and education sector, compared to 63% for large companies generally.
    - Small organizations: 60% expect increases, compared to 57% for small companies generally.
- The average budget growth expected for 1983 in the government and education sector is 12%, compared to 9% in 1982.
    - This represents an increase of 33% in the average rate of growth.
- Median spending on IS per government and education employee was $360. However, there was a broad range of spending ratios, as shown in the diagram in Exhibit III-173.

EXHIBIT III-172

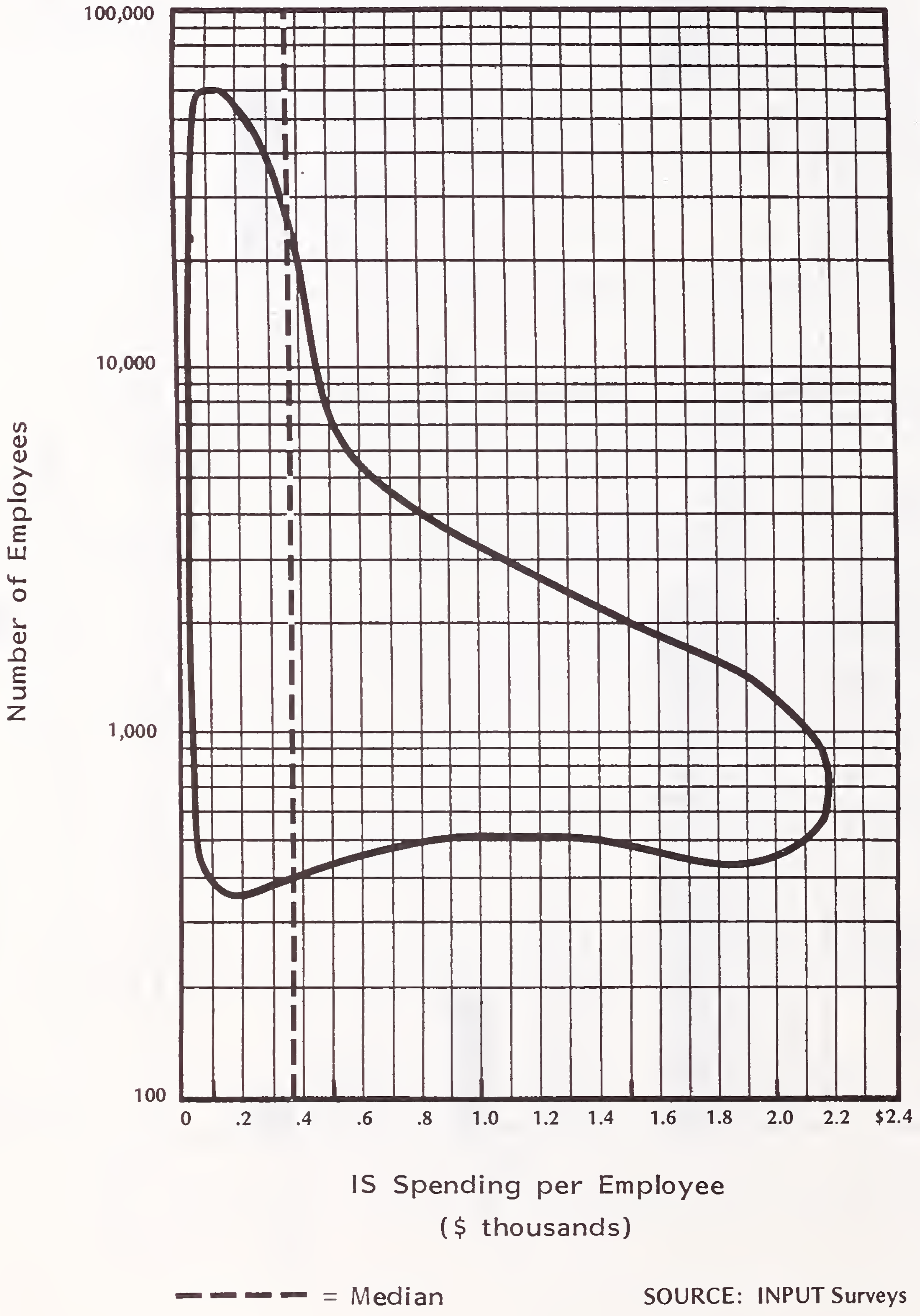
ANTICIPATED BUDGET INCREASES FOR 1983 IN THE GOVERNMENT AND EDUCATION SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-173

INFORMATION SYSTEMS SPENDING PER EMPLOYEE BY COMPANY SIZE IN THE GOVERNMENT AND EDUCATION SECTOR



SOURCE: INPUT Surveys

  - The reasons for this variation were discussed in Chapter II, Section B.

2. STAFFING

- Turnover in this sector is expected to be about 10% more than the all-industry average in 1983, as shown in Exhibit II-9.

  - Current turnover rates for individual positions are shown in Exhibit III-174. For technical positions the turnover rate is equivalent to the average for all sectors.

- Difficulty in recruiting staff in this sector was somewhat less than average, except for technical specialists, as shown in Exhibit III-175.

- The number of programs to be maintained averages 1.4% in this sector, although the range, both in absolute numbers and based on organization size, is quite broad, as shown in Exhibit III-176.

  - Maintenance, as a proportion of total workload, is almost exactly at the norm for all sectors, as shown in Exhibit III-177.

  - Organization size is not an important factor affecting maintenance loads, as shown in Exhibit III-178.

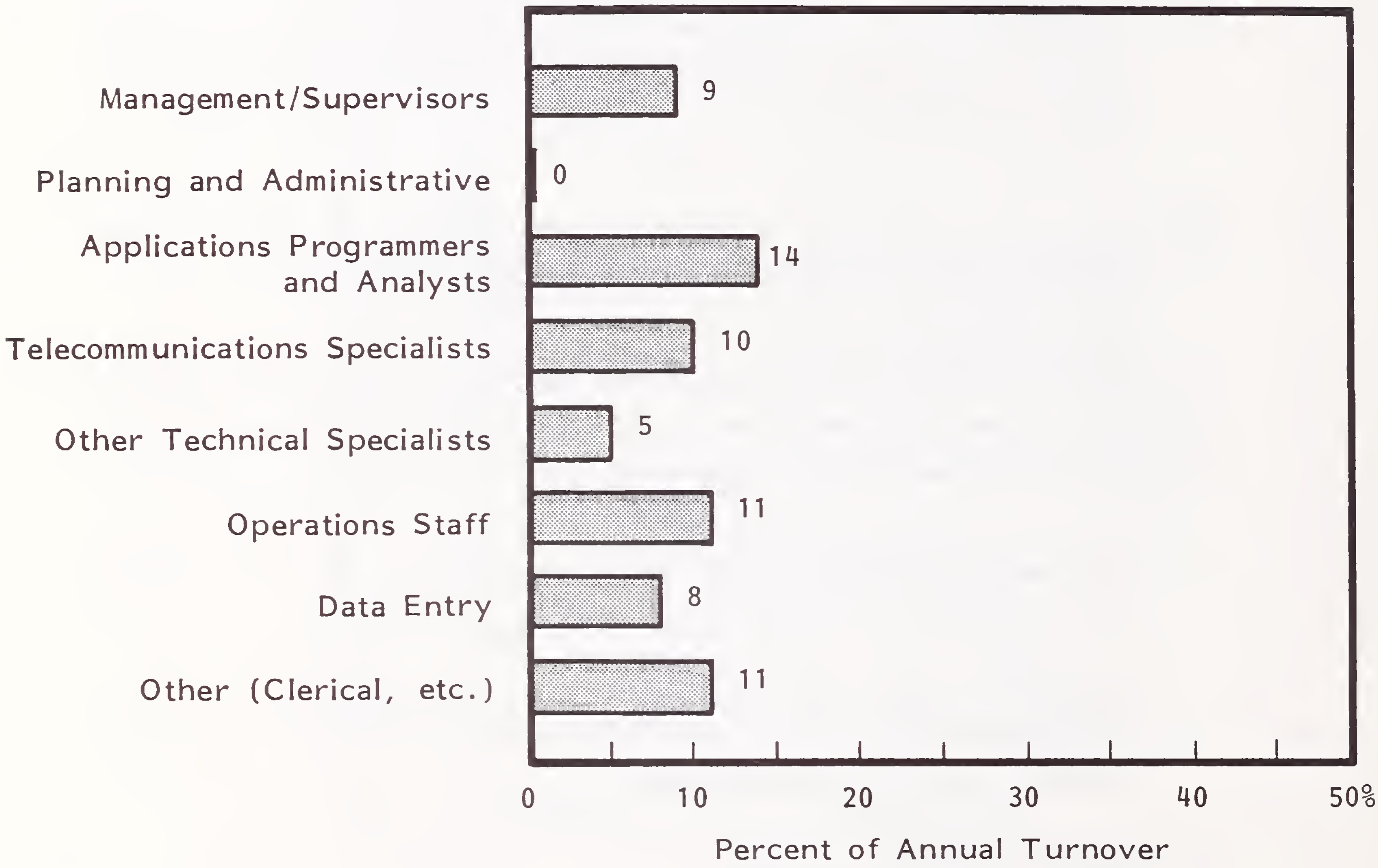
3. INFORMATION SYSTEMS ISSUES

- Note: please refer to Chapter II, Section D for a general discussion of IS problems, objectives, and initiatives and their interrelationships.

- The problems in the government and education sector are considerably different than those in the commercial sector, as shown in Exhibit III-179.

EXHIBIT III-174

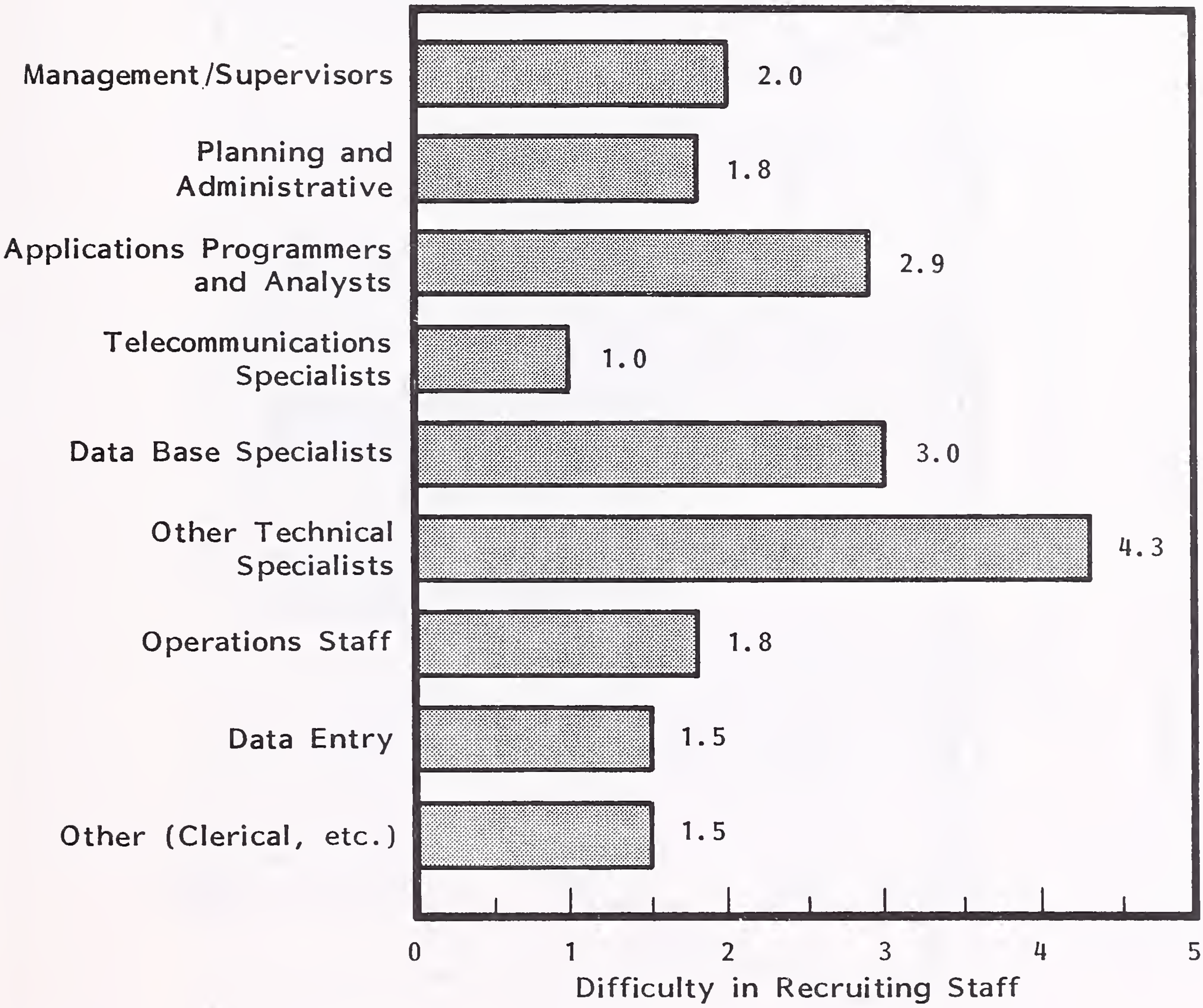
INFORMATION SYSTEMS STAFFING CURRENT ANNUAL TURNOVER IN THE GOVERNMENT AND EDUCATION SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-175

INFORMATION SYSTEMS DIFFICULTY IN RECRUITING STAFF IN THE GOVERNMENT AND EDUCATION SECTOR

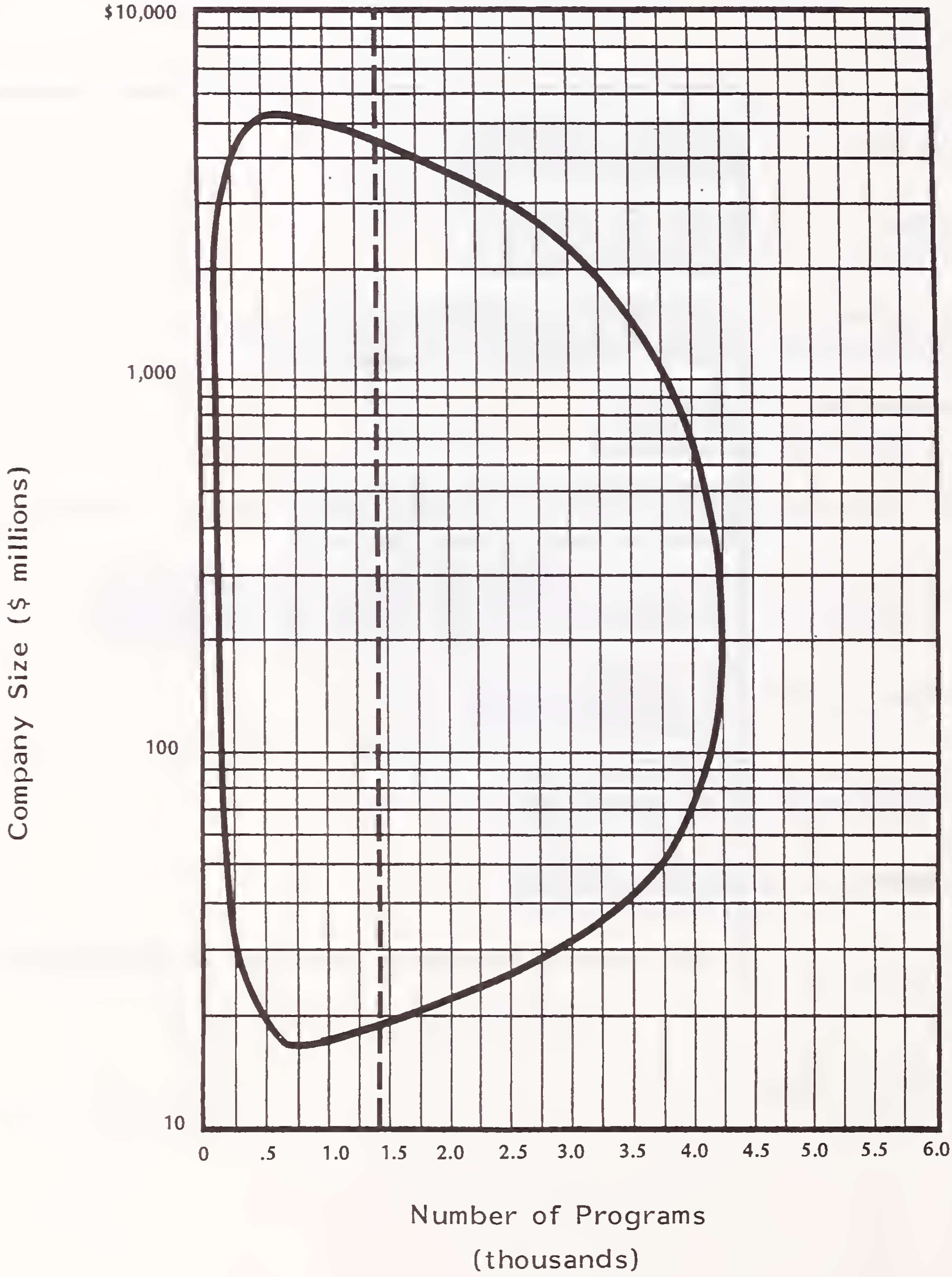


Scale: 1 = Low, 5 = High

SOURCE: INPUT Surveys

EXHIBIT III-176

NUMBER OF PROGRAMS BY COMPANY SIZE IN THE GOVERNMENT AND EDUCATION SECTOR

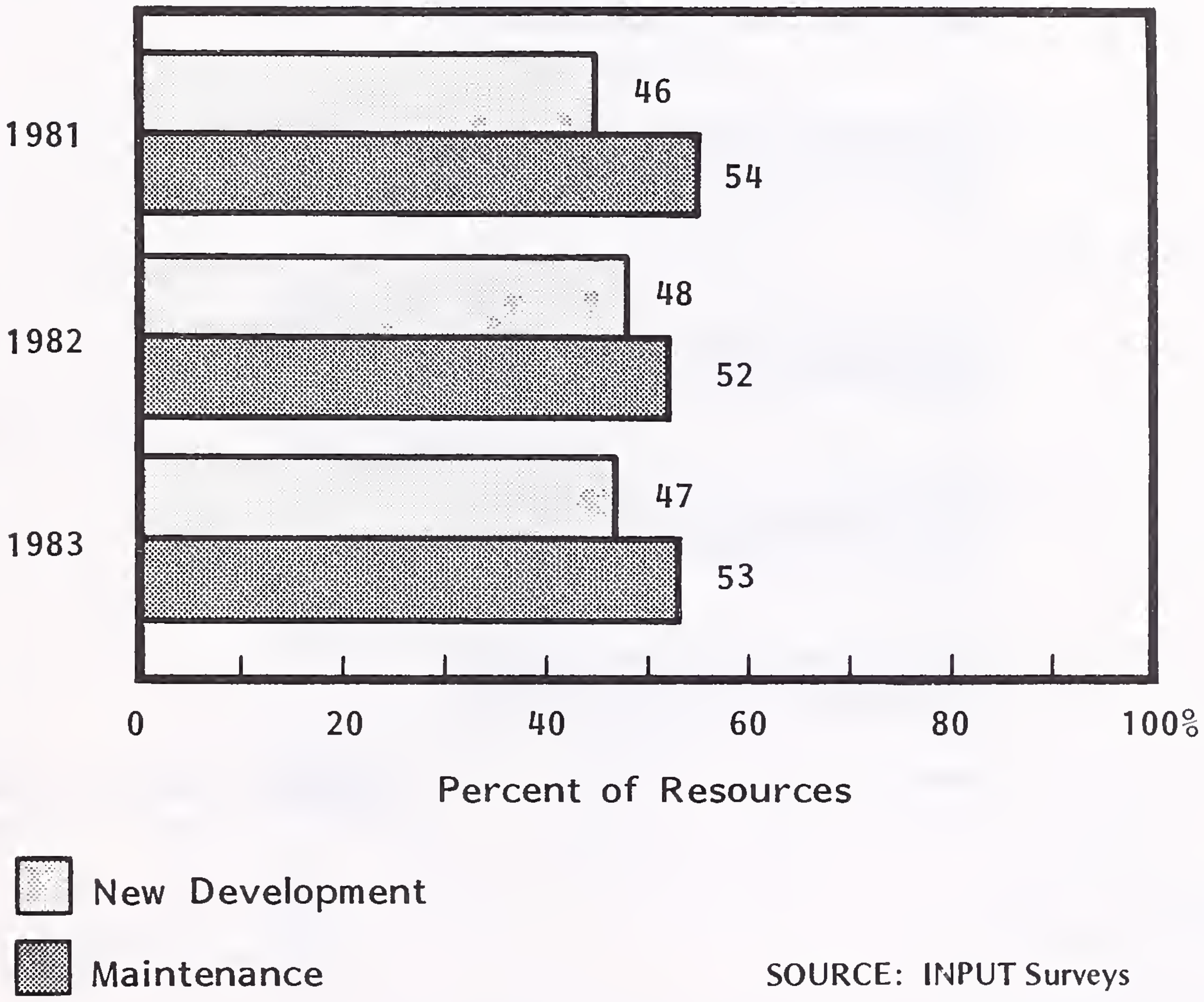


– – – – = Median

SOURCE: INPUT Surveys

EXHIBIT III-177

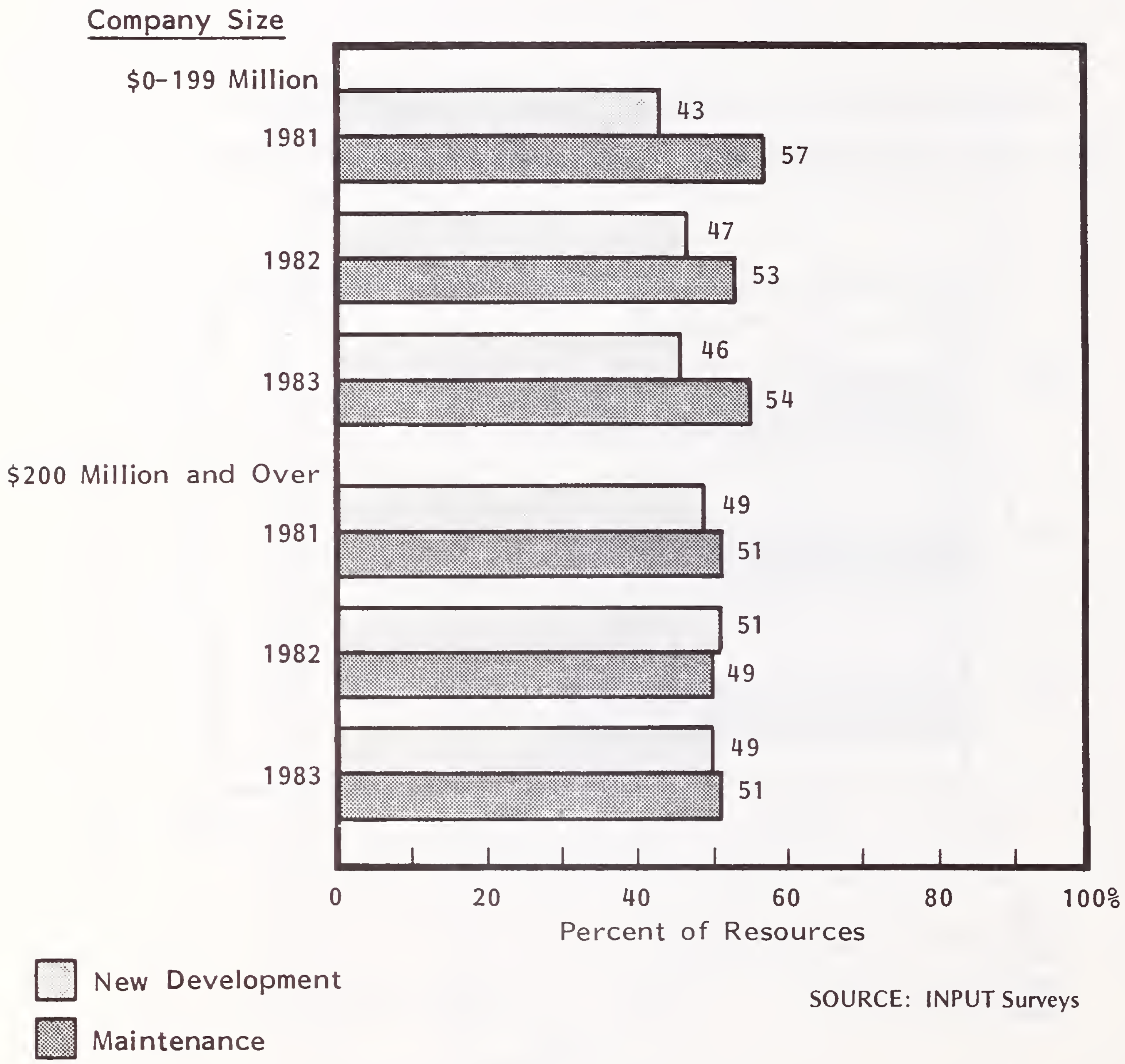
NEW PROGRAM DEVELOPMENT VERSUS MAINTENANCE IN THE GOVERNMENT AND EDUCATION SECTOR, 1981-1983



SOURCE: INPUT Surveys

EXHIBIT III-178

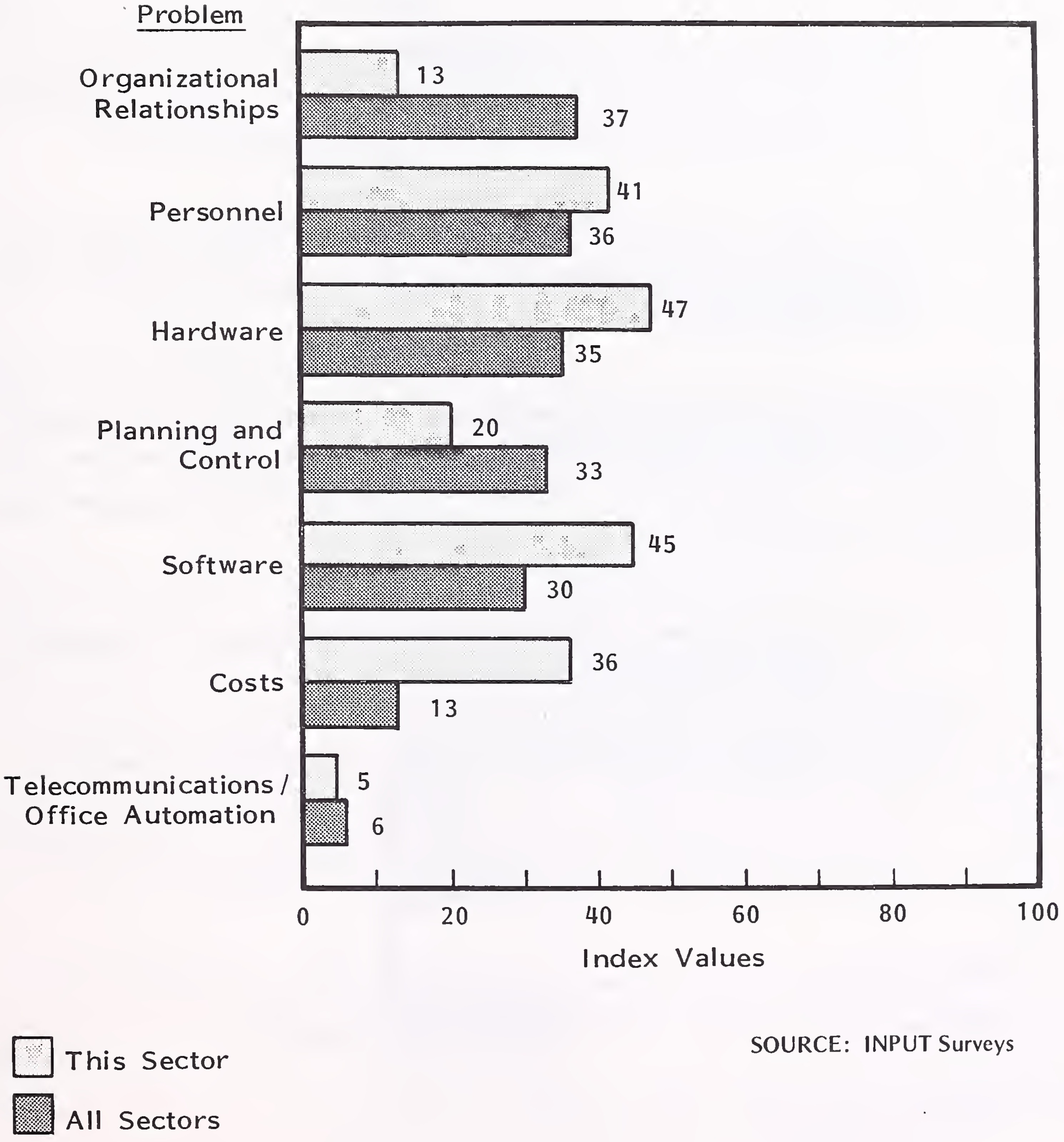
NEW PROGRAM DEVELOPMENT VERSUS MAINTENANCE IN THE GOVERNMENT AND EDUCATION SECTOR, 1981-1983



SOURCE: INPUT Surveys

EXHIBIT III-179

INFORMATION SYSTEMS PROBLEMS IN THE GOVERNMENT AND EDUCATION SECTOR



SOURCE: INPUT Surveys

  - Costs are far more of a problem than in any other sector. This is related to the recession and, what is more important, to the new attitudes toward the public sector.

  - Software is also more of a problem than in any other sector. This is caused by the age and/or indifferent quality of many public sector systems.

  - Organizational relationships are considered less of a problem here than in any other sector. This is related to the political and/or civil service structure of most of the organizations in this sector.

  - More detailed information about specific problem areas is contained in Exhibit III-180. This exhibit shows the percentage of companies in this sector which regard an issue as a major problem.

- It is ironic that while this sector has the most problems with costs, it has no objectives in the cost area, as shown in Exhibit III-181. This is because cost objectives are imposed from the outside; there are no incentives to set cost reduction as an IS goal in this environment.

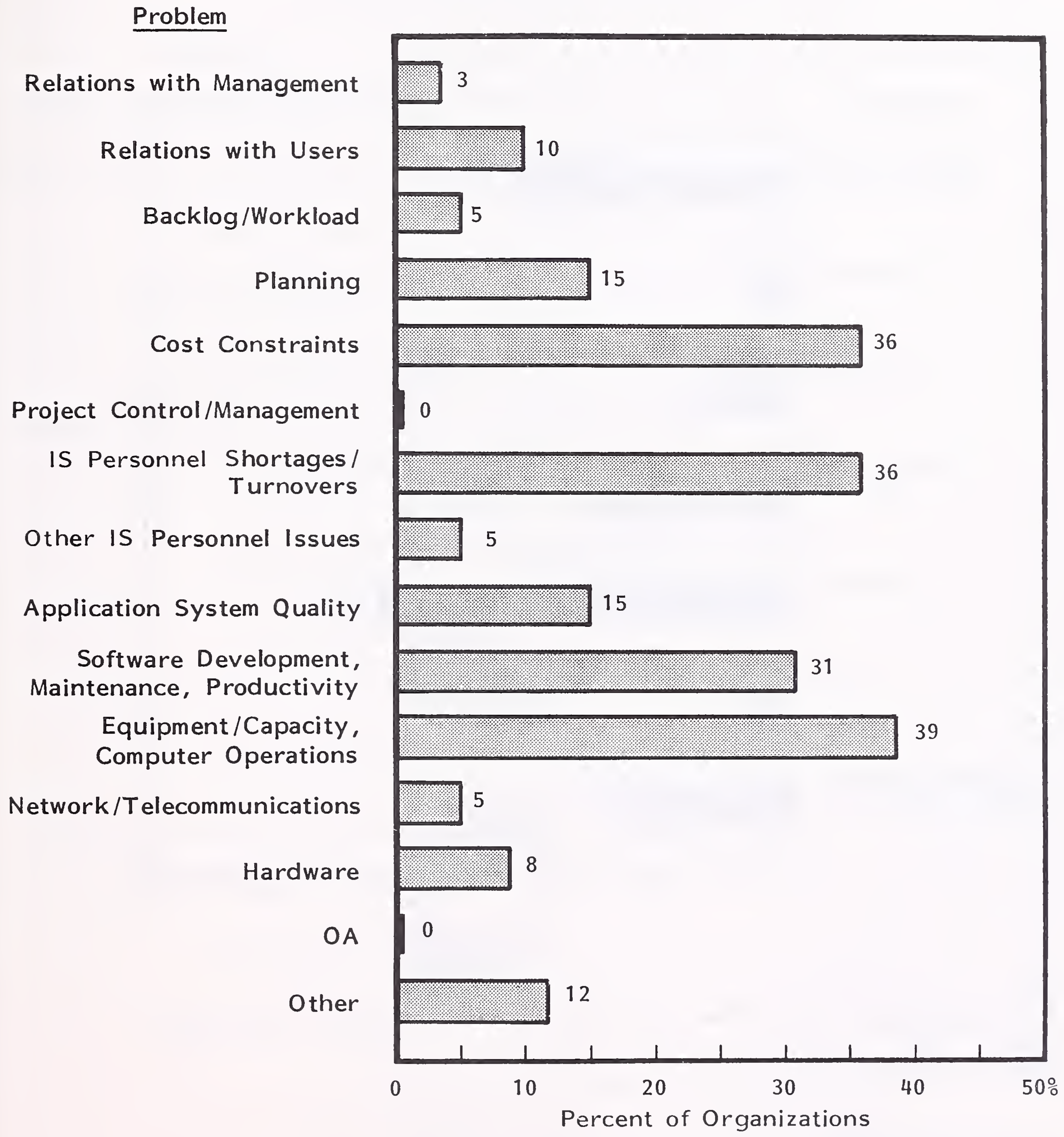
  - Similarly, there are no objectives involving planning and control. These are also generally imposed from the outside.

  - More detailed information about specific planning objectives is contained in Exhibit III-182. This exhibit shows the percentage of companies in this sector which have identified particular planning objectives as being of major importance to them.

- Not surprisingly, the government and education sector has more cost-related initiatives than any other sector, as shown in Exhibit III-183.

EXHIBIT III-180

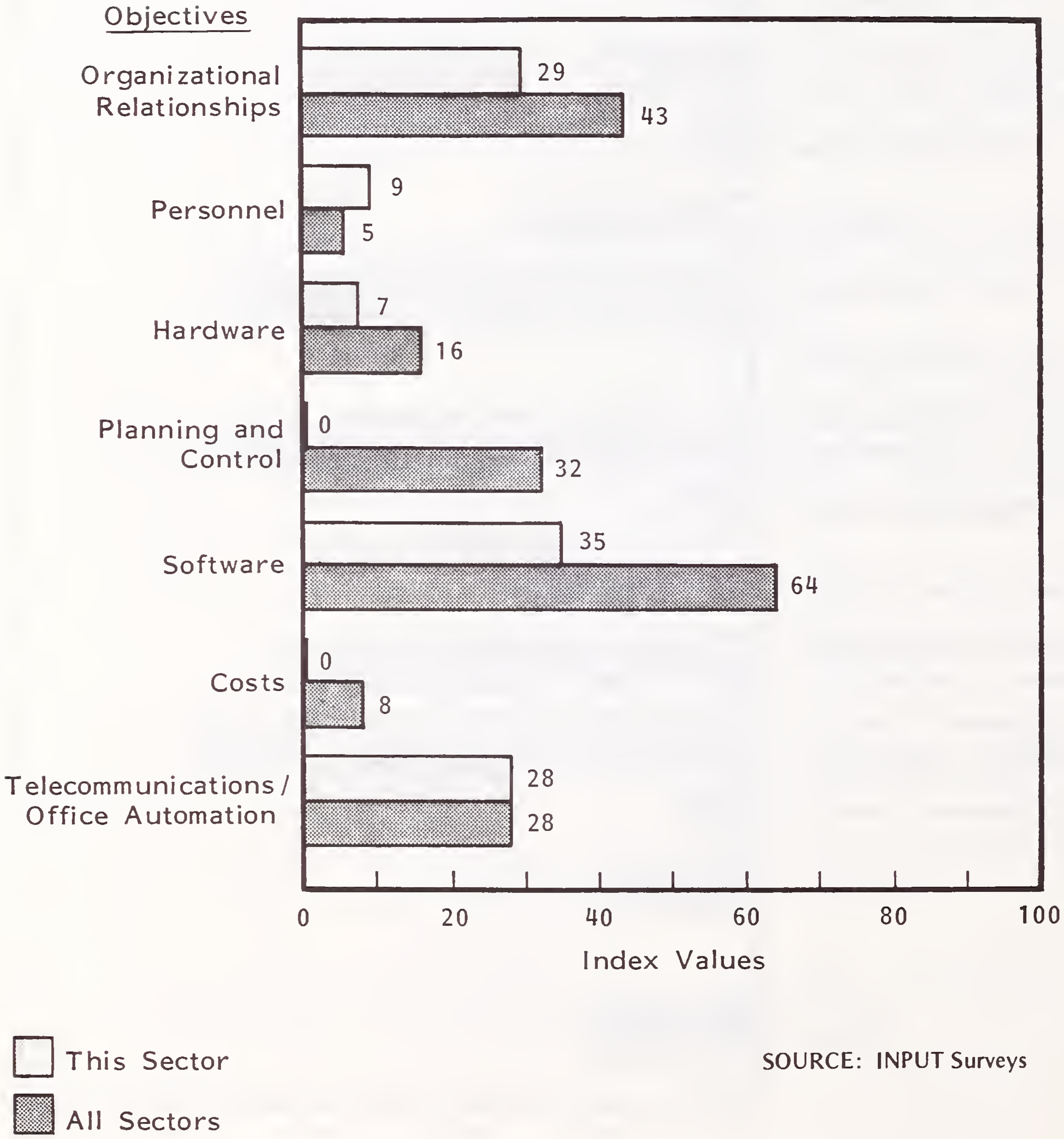
PROBLEMS IN THE GOVERNMENT AND EDUCATION SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-181

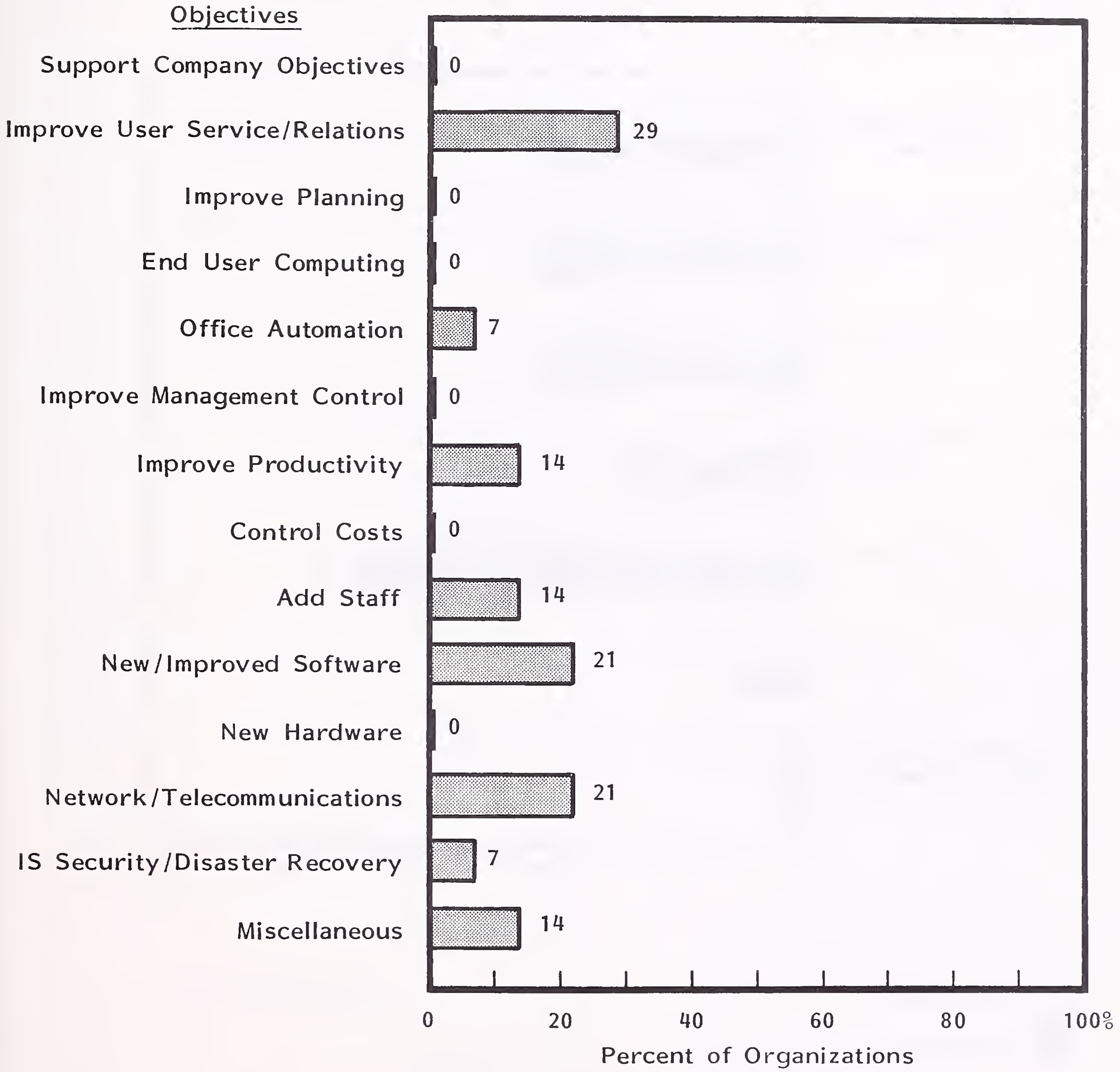
INFORMATION SYSTEMS OBJECTIVES IN THE GOVERNMENT AND EDUCATION SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-182

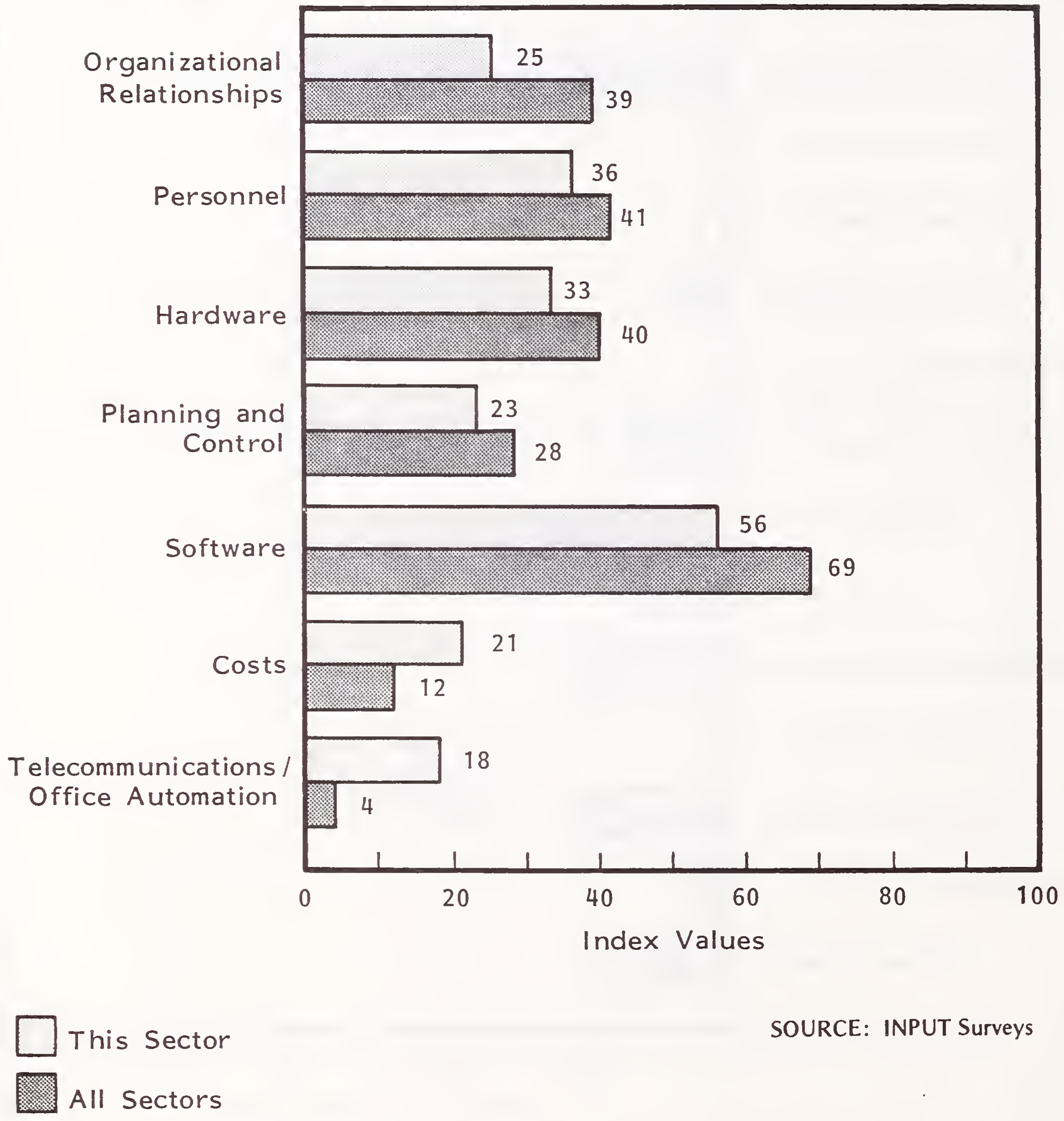
INFORMATION SYSTEMS OBJECTIVES IN THE GOVERNMENT AND EDUCATION SECTOR



SOURCE: INPUT Surveys

EXHIBIT III-183

INFORMATION SYSTEMS INITIATIVES IN THE GOVERNMENT AND EDUCATION SECTOR



SOURCE: INPUT Surveys

- It also has more telecommunications and office automation initiatives. This is related both to cost reduction efforts as well as to the geographically dispersed nature of many government organizations.

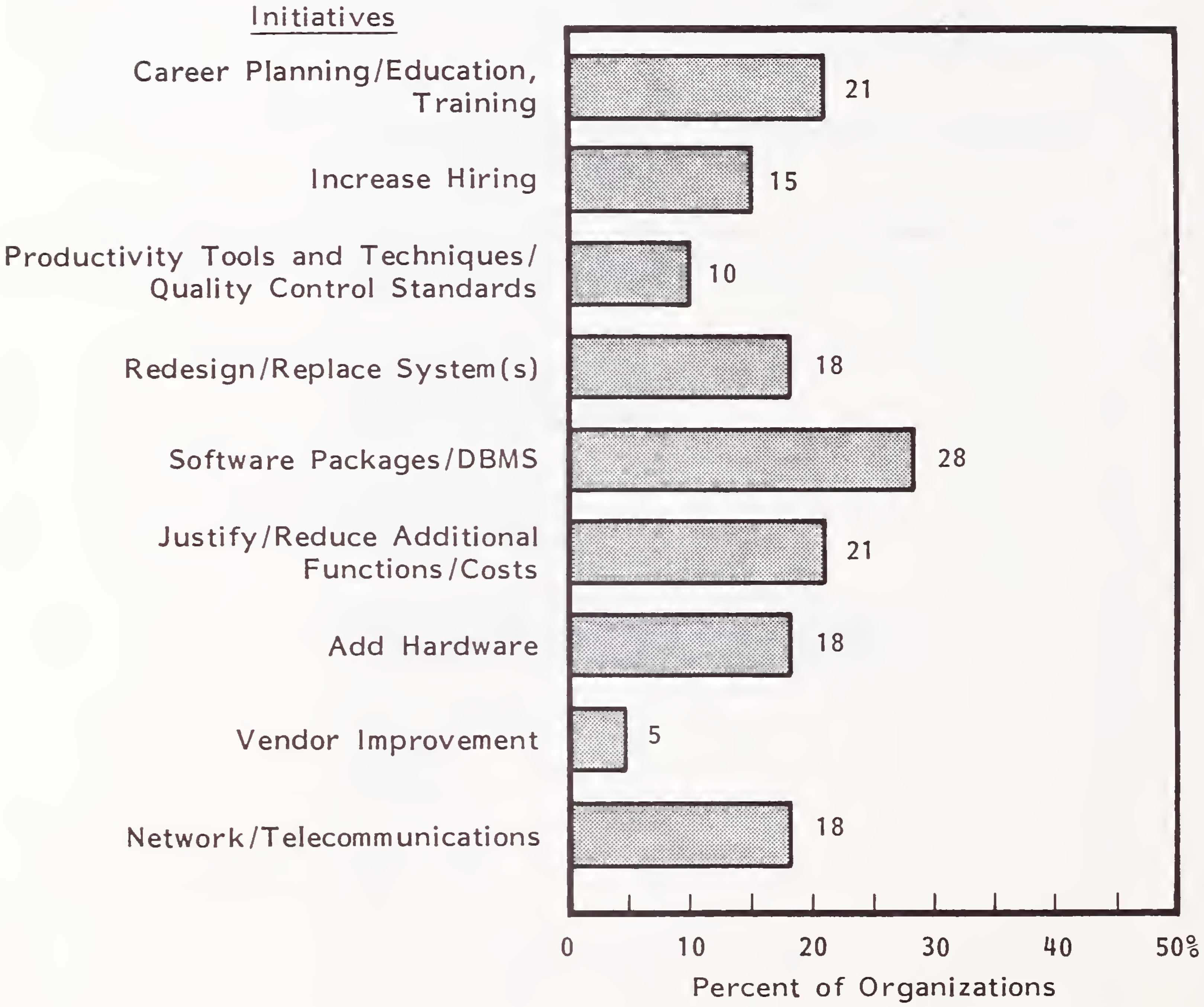
- More detailed information about specific areas where an initiative is planned is contained in Exhibit III-184. This exhibit shows the percentage of companies in this sector which plan a major initiative in a particular area.

4. PERSONAL COMPUTERS

- Note: no separate data is available for the government and education sector.

EXHIBIT III-184

INFORMATION SYSTEMS INITIATIVES PLANNED IN THE GOVERNMENT AND EDUCATION SECTOR

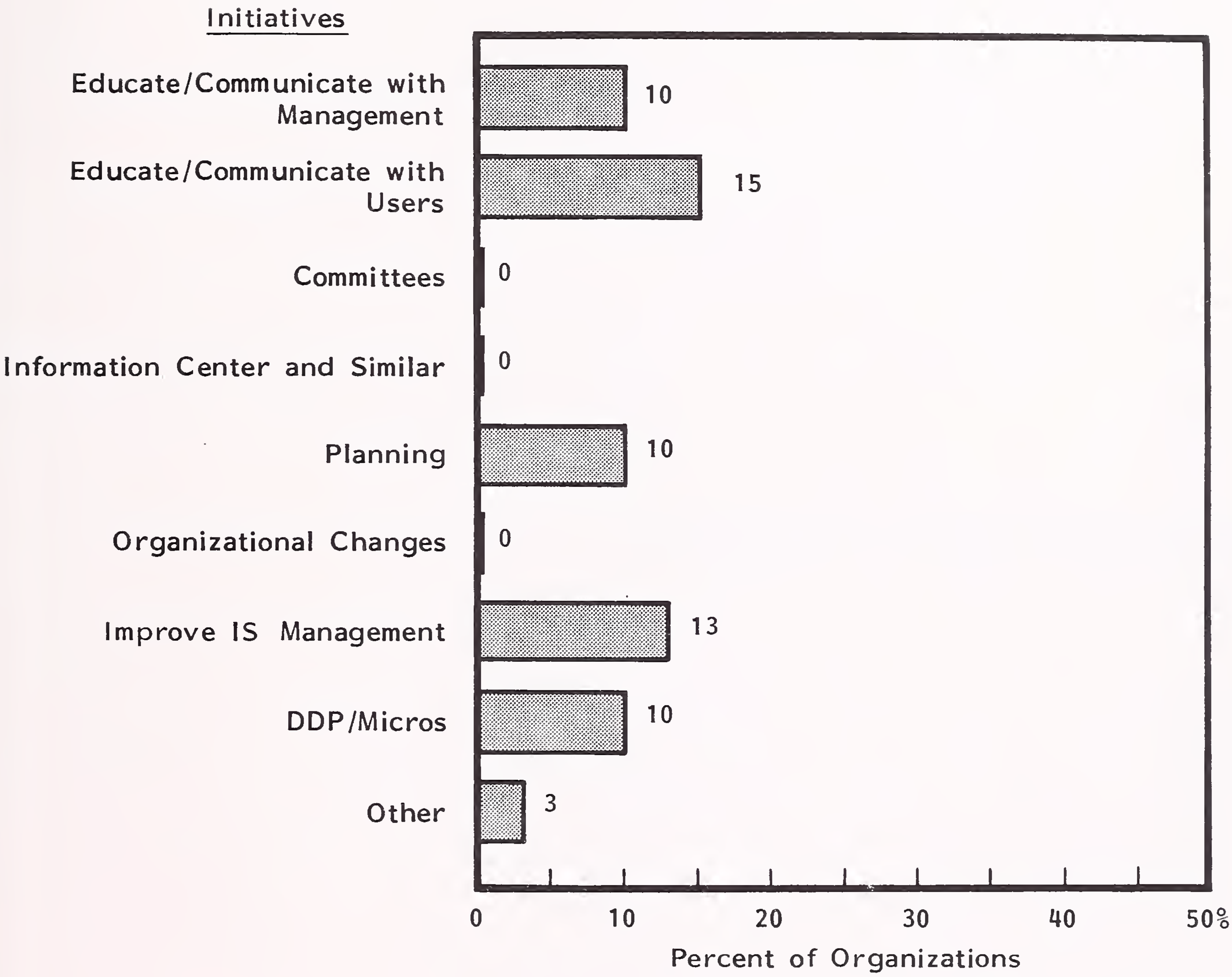


Continued

SOURCE: INPUT Surveys

EXHIBIT III-184 (Cont.)

INFORMATION SYSTEMS INITIATIVES PLANNED IN THE GOVERNMENT AND EDUCATION SECTOR



SOURCE: INPUT Surveys

APPENDIX A: QUESTIONNAIRE

INPUT CONFIDENTIAL

GROUP CODE ☐☐☐-☐ CATALOG NO. U A 8 2 ☐☐☐☐-☐

INFORMATION SYSTEMS MANAGEMENT QUESTIONNAIRE - 1982

Company Name ____________________

Address ____________________

____

____

Respondent's Name ____________________

Title ____________________

Telephone Number ____________________

Division Name (if responding for part of an organization.) ____________________

Address ____________________

____

____

Mailing Address (if different from either of above) ____________________

____

____

Questionnaire received from: ☐ INPUT ☐ Affiliated organization (give name): ____________________

Further conditions on prize eligibility:

- Prizes will be awarded by a random drawing of entries received by the indicated dates. No employee or relative of an employee of INPUT is eligible. Winners will be notified by telephone and by certified mail. Odds of winning are dependent on the number of entries received. All prizes will be awarded. Lists of prize winners will be sent to those who inquire in writing after June 30, 1982.
- Each entrant can win no more than one prize. The prize will be awarded to the name or names on this cover sheet. Where there are multiple names on a cover sheet, a single prize will be awarded jointly.
- The name of the organization must be shown on the cover sheet to be eligible for a prize (Note: No data will be associated with the name of a particular respondent or organization).
- Normally, only one questionnaire per organization (the first received) will be eligible for a prize and only from those organizations to whom INPUT has addressed a questionnaire packet. However, note the following exception:
  - Additional copies of the questionnaire and associated material may be made by recipients and directed to affiliated parent organizations or divisions which have their own EDP operations and whose data would not be reflected in the original recipient's reply.
  - Questionnaires received from such affiliated organizations will also be eligible to receive a prize. In such cases be sure to note on the cover sheet whether INPUT or an affiliated organization forwarded the questionnaire.

For our information, please complete the following personal computer-related information about yourself.

Age ☐ ________ Sex: ☐ Male ☐ Female

Annual Family Income:

- ☐ Under $25,000
- ☐ $25,000 - $39,999
- ☐ $40,000 - $59,999
- ☐ $60,000 - $79,999
- ☐ $80,000 - $99,999
- ☐ $100,000 and over

- Check as many of the following as apply.
  - I have unrestricted use of a personal computer system
    ☐ At home: Name/Model ______________________________ ☐ Since (year) __________
    ☐ At work: Name/Model ______________________________ ☐ Since (year) __________
  - I share the use of a personal computer system
    ☐ At home: Name/Model ______________________________ ☐ Since (year) __________
    ☐ At work: Name/Model ______________________________ ☐ Since (year) __________
- My hands-on use of a personal computer is approximately_____hours per week.
  - I expect that one year from now my hands-on use will be____hours per week.
- At my direction, others use a personal computer approximately____hours per week.
  - I expect that one year from now this use will be____ hours per week.

CATALOG NO. U A 8 2 ☐☐☐☐ - ☐

GROUP CODE ☐☐☐ - ☐

A. GENERAL INFORMATION

Definitions:

- "Division" refers to an entity (i.e., subsidiary, division, operating unit, agency, department, commission, etc.) under a common organizational umbrella.
- "Revenues" are defined as follows in these industries.
  - For banks, use total assets
  - For insurance companies, use premiums
  - For governmental bodies, use authorized budget for the entire governmental unit
  - Otherwise, use your organization's definition and specify what it is:________

1. What is the primary business or activity of your entire organization?________
   Annual revenues: $______million; Number of employees:________
2. Several questions in this questionnaire refer to EDP staffing levels, budgets, etc. How comprehensive is the quantitative information you will be supplying?
   ☐ Applicable to the entire organization
   ☐ Applicable largely to a corporate or headquarters unit, with not all divisional data included. Please note principal exclusions:
   ____
   ☐ Applicable to a single division. Primary business of division:________
   Annual division revenues: $______million; Number of division employees:________

B. EDP ORGANIZATION

3. Please indicate the current number of EDP employees by position type as well as the net amount you expect this number to increase or decrease twelve months from now (Example: if there is currently a total of ten employees and you expect two departures and three hires, put "+1" under "increase"). Also indicate your current turnover rate and the amount of difficulty you are having in recruiting qualified staff at your salary levels.

POSITION	CURRENT NUMBER OF EDP EMPLOYEES	CURRENT NUMBER OF OUTSIDE CONTRACTORS	NET CHANGE EXPECTED 12 MONTHS FROM NOW		CURRENT ANNUAL TURNOVER PERCENT	DIFFICULTY IN RECRUITING STAFF (circle: 1=low, 5=high)
			EDP EMPLOYEES	OUTSIDE CONTRACTORS		
Management/supervisors						1 2 3 4 5
Planning and administrative						1 2 3 4 5
Applications programmers and analysts						1 2 3 4 5
Telecommunications specialists						1 2 3 4 5
Data base specialists						1 2 3 4 5
Other technical specialists						1 2 3 4 5
Operations staff						1 2 3 4 5
Data entry						1 2 3 4 5
Other clerical						1 2 3 4 5
Other						1 2 3 4 5
Total						

4. Does the central EDP organization supply?	Amount
Applications software development	☐ None ☐ Some ☐ Most ☐ All
Applications software maintenance	☐ None ☐ Some ☐ Most ☐ All
Computer processing	☐ None ☐ Some ☐ Most ☐ All
Planning and standard setting	☐ None ☐ Some ☐ Most ☐ All

5. Please attach an organization chart describing your organization, especially its relationship to top management, other EDP areas (if any) and user departments? ☐ attached

C. EDP PLANNING

6. What do you consider to be your top three problems (with "1" being the most serious)? What action do you intend to take to resolve them?

PROBLEM		ACTION	
1.			
2.			
3.			

7. What are your top three objectives to accomplish in the next three years (with "1" being the most important)? How do you plan to achieve them? (Note: There may or may not be overlap between this and the previous question.)

OBJECTIVE		MEANS TO ACCOMPLISH	
1.			
2.			
3.			

8. In your opinion, during the next three years what is the likelihood of there being significantly greater:	Likelihood In Your Company/Division			Likelihood In Your Industry			Likelihood In EDP Generally		
	Low	Medium	High	Low	Medium	High	Low	Medium	High
Software reliability	☐	☐	☐	☐	☐	☐	☐	☐	☐
Use of application software packages	☐	☐	☐	☐	☐	☐	☐	☐	☐
Use of non-procedural languages in EDP departments	☐	☐	☐	☐	☐	☐	☐	☐	☐
Productivity in developing new software	☐	☐	☐	☐	☐	☐	☐	☐	☐
Productivity in maintaining existing software	☐	☐	☐	☐	☐	☐	☐	☐	☐
Programming by end users	☐	☐	☐	☐	☐	☐	☐	☐	☐
Computer operation by end user departments	☐	☐	☐	☐	☐	☐	☐	☐	☐
Expenditures on EDP security	☐	☐	☐	☐	☐	☐	☐	☐	☐
Importance of EDP to top management	☐	☐	☐	☐	☐	☐	☐	☐	☐
Other trends (lists)	☐	☐	☐	☐	☐	☐	☐	☐	☐
____________________	☐	☐	☐	☐	☐	☐	☐	☐	☐

9. What research or information would be most helpful to your planning or development efforts?____________________ ☐

____ ☐

D. EDP EXPENDITURES

10. Please categorize your 1982 EDP budget and indicate the expected rate of change for 1983.

CATEGORIES	1982 EDP BUDGET	ANTICIPATED PERCENT CHANGE IN 1983		
	Amount	Increase	Decrease	Percent
Personnel salaries	$_____,_____, 000	☐	☐	%
Mainframe processors	$_____,_____, 000	☐	☐	%
Minicomputers	$_____,_____, 000	☐	☐	%
Microcomputers/personal computers	$_____,_____, 000	☐	☐	%
Terminals	$_____,_____, 000	☐	☐	%
Peripherals	$_____,_____, 000	☐	☐	%
Communications hardware and software	$_____,_____, 000	☐	☐	%
Network expense (line cost only)	$_____,_____, 000	☐	☐	%
Other software (purchase or lease)	$_____,_____, 000	☐	☐	%
Software maintenance	$_____,_____, 000	☐	☐	%
Hardware maintenance	$_____,_____, 000	☐	☐	%
Personnel training	$_____,_____, 000	☐	☐	%
Outside processing services	$_____,_____, 000	☐	☐	%
Data security and disaster recovery	$_____,_____, 000	☐	☐	%
Supplies	$_____,_____, 000	☐	☐	%
Utilities	$_____,_____, 000	☐	☐	%
Other	$_____,_____, 000	☐	☐	%
	$_____,_____, 000	☐	☐	%
Total	$_____,_____, 000	☐	☐	%

11. Does the personnel salary amount include fringe benefits? ☐ Yes ☐ No
Fringe benefit rate = ________%

12. Does the personnel salary amount include an overhead charge? ☐ Yes ☐ No
Overhead rate = ________%

13. Do the non-personnel budget categories include an overhead charge? ☐ Yes ☐ No
Overhead rate = ________%

14. To what extent are these figures dependent on your organization's general economic condition? (check as many as apply)
- ☐ EDP budget will increase if profits increase
- ☐ EDP budget will decrease if profits decrease
- ☐ EDP budget will increase if revenues increase
- ☐ EDP budget will decrease if revenues decrease
- ☐ EDP budget will not be affected by organizational profitability
- ☐ Other: ____________________
____

15. What was your total 1981 expenditure?
$________,________000.

16. Approximately what percentage of your EDP budget do you recover by commercial sales to other organizations? (________%)
By allocations/chargeback within your own organization? (__________%)

17. If you allocate/chargeback, what method is used? (check as many as apply) ☐ Division revenue ☐ EDP resources used ☐ Transaction/output type ☐ Other: ______________________ Which costs are allocated/charged back? ☐ Application development ☐ Application maintenance ☐ Computer operation ☐ Data entry

18. What is the typical programmer/analyst chargeback rate? ($______/hr.)

19. Please indicate below EDP expenditures that are not in your budget but are spent within the budgets of the end users whom you serve.

	CATEGORY	1982 END USER EDP EXPENDITURES	ANTICIPATED PERCENT CHANGE IN 1983		
		Amount	Increase	Decrease	Percent
☐		$_____, _____, 000	☐	☐	%
☐		$_____, _____, 000	☐	☐	%
☐		$_____, _____, 000	☐	☐	%
☐		$_____, _____, 000	☐	☐	%
☐		$_____, _____, 000	☐	☐	%
☐		$_____, _____, 000	☐	☐	%
☐		$_____, _____, 000	☐	☐	%
	Total	$_____, _____, 000	☐	☐	%

20. If the total in question 19 is the "tip of the iceberg", please estimate what the additional amount might be: $________,________,000; ☐ Don't know.

21. What is the margin of error in this estimate? + or - __________% ☐ Don't know

E. EDP OPERATIONS

22. Please indicate the number of mainframe and minicomputer systems installed and on order; also indicate current and planned operating systems.

DO NOT USE		VENDOR NAME	MODEL NUMBER	NUMBER OF CPU'S		OPERATING SYSTEM(S)	
				Installed	On Order	Using Now	Planned

23. What network control software are you presently using or plan to install in three years?

Network Control Software	Now Using (circle)	Install In 3 Years (circle)
Bisync	Y N	Y N
SNA	Y N	Y N
X.25	Y N	Y N
	Y N	Y N
	Y N	Y N
	Y N	Y N

24. Do you have a separate application development computer? ☐ Yes ☐ No, If yes; What model computer?______________ How many people use it, on an average?__________ How many terminals are connected to it?__________ ☐☐

25. What is the extent of your local network activities?

	LOCAL NETWORK NAME/TYPE	NUMBER OF DEVICES HOOKED UP				COMMENT
		1982	1983	1984	1985	
☐						
☐						
☐						

F. EDP APPLICATIONS

26. Accompanying this questionnaire is a representative, but by no means exhaustive, list of applications. Please indicate the five most important applications which you will be working on in 1982 (with "1" being the most important).

Application			Estimated Cost to Develop	Number of People Assigned	Total Lines of Code	Months Duration	Estimated Annual Cost To Run	Developed In-house? (circle)	New System (N) or Enhancement (E)? (circle one)	On-line? (circle)
Prior-ity	Code	Name								
1.			$,000		,000		$,000	Y N	N E	Y N
2.			$,000		,000		$,000	Y N	N E	Y N
3.			$,000		,000		$,000	Y N	N E	Y N
4.			$,000		,000		$,000	Y N	N E	Y N
5.			$,000		,000		$,000	Y N	N E	Y N

27. What percent of your applications analysts and programmers are assigned to:

	1981	1982	1983
New program development	%	%	%
Enhancement/upgrade of existing programs	%	%	%
Maintenance of existing programs	%	%	%
Other	%	%	%
Total	%	%	%

28. What is the most significant event within your industry that affected your applications development in the last twelve months?

____

____

____

29. What is the approximate number of programs being actively maintained? ____________
Lines of code? ____________

30. What measures are you taking to reduce the time and costs associated with program development? ____________

____

____

31. What level of improvement (measured in terms of lines of code per man-day) do you estimate these measures will provide? _____%

G. MAINTENANCE

32. Where is the equipment located that EDP is responsible for maintaining?

☐ In a computer room	________ %
☐ In a general office environment	________ %
☐ In a plant or factory	________ %
☐ Other	________ %
Total	100 %

33. What is your annual hardware maintenance budget for:	CPU		PERIPHERALS		COMMUN. EQUIP. TERMINALS		OFFICE EQUIP./ WORD PROC.	
	Purchased	Leased/ Rented	Purchased	Leased/ Rented	Purchased	Leased/ Rented	Purchased	Leased/ Rented
Internal (in-house) maintenance	$	$	$	$	$	$	$	$
External (vendor) maintenance	$ XXXX	$ XXXX	$ XXXX	$ XXXX	$ XXXX	$ XXXX	$ XXXX	$ XXXX
• Provided by manufacturer	$	$	$	$	$	$	$	$
• Provided by third party	$	$	$	$	$	$	$	$

What type of maintenance plans do you use? (check as many as apply) ☐ Contract ☐ Time and materials ☐ Repair depot
☐ Other: ____________________

34. In evaluating maintenance, how important is each of the following criteria?

Maintenance For	CRITERIA (Circle: 1 = Low Importance, 5 = High Importance)				
	Cost	Uptime (System Availability)	Response Time to Repair	Vendor Reputation	Other ________
Hardware	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
Software	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

35. How much of your purchased software do you maintain yourself? ☐ None ☐ Some ☐ Most ☐ All
Why? ____________________

36. Do you receive and act on purchasing suggestions by vendor maintenance personnel? (Circle: Y = Yes, N = No, DK = Don't know)

	New Systems	Peripherals	Communications	Software	Supplies
Receive suggestions	Y N DK	Y N DK	Y N DK	Y N DK	Y N DK
Act on them	Y N DK	Y N DK	Y N DK	Y N DK	Y N DK

37. How extensive has your experience been in using third party maintenance (i.e., by an organization other than original vendor) and how satisfied have you been? Do you expect to increase your use of third party maintenance?

	MAINTENANCE AREA (Circle: 1 = Low, 5 = High)					
	CPUs	Peripherals	Office Equip.	Terminals	Communications Equipment	Software
Amount of experience	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
Satisfaction	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
Likelihood of increased use	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

H. PERSONAL COMPUTER/SMALL BUSINESS SYSTEMS (Note: A personal computer or small business systems is defined here as a standalone system costing under $15,000.)

38. How many personal computers/small business systems are or will be installed throughout your organization?

DO NOT USE		Vendor/ Model	Now Installed	To Be Installed In 12 Months	To Be Installed After 12 Months

39. Is it likely that there are significant numbers installed or planned that you are not aware of? ☐ Yes ☐ No, Why?__________________

____

______________________________________ ☐

40. In deciding to purchase personal computers/small business systems how important is each of the following criteria to the EDP department and to user departments? (1 = low, 5 = high)

CRITERIA	IMPORTANCE (Circle) To EDP					To Users				
Hardware cost	1	2	3	4	5	1	2	3	4	5
Software cost	1	2	3	4	5	1	2	3	4	5
Maintenance cost	1	2	3	4	5	1	2	3	4	5
Discounts	1	2	3	4	5	1	2	3	4	5
Service availability	1	2	3	4	5	1	2	3	4	5
Amount of software available	1	2	3	4	5	1	2	3	4	5
Software features	1	2	3	4	5	1	2	3	4	5
Hardware features	1	2	3	4	5	1	2	3	4	5
Hardware reliability	1	2	3	4	5	1	2	3	4	5
Vendor reputation	1	2	3	4	5	1	2	3	4	5
Compatibility with mainframe	1	2	3	4	5	1	2	3	4	5

41. What do you see as the role of the EDP department concerning personal computers/small business systems? (check all applicable)

- ☐ Initiate ordering and placement of hardware
- ☐ Fund purchases for user departments
- ☐ Approve user department purchases
- ☐ Set firm specifications for purchases
- ☐ Issue purchase guidelines whose observance is optional
- ☐ Evaluate personal computer software for user departments
- ☐ Develop special personal computer software
- ☐ Make sections of corporate data available to personal computer users
- ☐ Educate potential users on capabilities of personal computers
- ☐ Other ________________________________

I. OFFICE SYSTEMS ISSUES

42. Please check which of the office automation and communications services listed below are currently being used or planned within 2 years.

CATEGORY	CURRENT Using it Now	Definite Plans	BY 1984 Probable	Don't Know/ No Plans	COMMENT
Intra-company electronic mail	☐	☐	☐	☐	
Communicating word processors	☐	☐	☐	☐	
Video conferencing — freeze frame	☐	☐	☐	☐	
Video conferencing — full motion	☐	☐	☐	☐	
Sub-minute facsimile	☐	☐	☐	☐	
Intra-building wideband facilities	☐	☐	☐	☐	
Integrated voice/data network	☐	☐	☐	☐	
Dedicated satellite earth station	☐	☐	☐	☐	
Computerized PBX	☐	☐	☐	☐	
Automatic network management systems	☐	☐	☐	☐	
Worldwide data communications networks	☐	☐	☐	☐	
Private packet transmission (X.25)	☐	☐	☐	☐	
Integration of office systems and EDP	☐	☐	☐	☐	

J. NEW SERVICES

43. Has IBM contacted your department concerning the use of their newly-announced processing service? ☐ Yes ☐ No

44. Do you intend to utilize this service? ☐ Yes ☐ No ☐ Don't know, Why?____________________

____ ☐

45. What other new services are you planning to utilize?________________________________

____

THANK YOU.

APPENDIX B: 1982 RESPONDENTS

APPENDIX B: 1982 RESPONDENTS

- Data for the 1982 Annual Report was obtained from 564 responding organizations, distributed as follows:

NUMBER OF RESPONDENTS BY ORGANIZATION SIZE
(Revenues)

Sector	Under $200 Million	Between $200 Million and $1 Billion	Over $1 Billion	Total
Discrete Manufacturing	21	37	36	94
Process Manufacturing	19	25	54	98
Transportation	9	14	9	32
Utilities	7	15	22	44
Banking/Finance	7	14	45	66
Insurance	20	13	16	49
Distribution	24	27	21	72
Services	44	17	8	69
Government and Education	27	10	3	40
TOTAL	178	172	214	564

- Reporting organizations were for the most part distinct legal entities, but some were self-sufficient divisions of companies.